MAY 19 1925

CHEMICAL LIBRARY

Have You Done Your Part Toward Making the American Pharmacy Headquarters an Accomplishment?

Vol. XIV, No. 5 MAY, 1925

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

CONTENTS

Frontispiece and Sketch—John Granville Godding ... 373
All Are a Part of the American Pharmaceutical Association—Whelpley ... 376
Bricks Wanted To Build a Home for American Pharmacy—Swallow ... 377
Editorial:
Are You Keeping Up Your End? ... 378
Commencements ... 379
Anesthetic Properties of the Olefine Hydrocarbons, Ethylene, Propylene, Butylene and Amylene—Riggs ... 380
Some Physical Constants of Acetylsalicylic Acid—Hayman, Wagener and Holden ... 388
Some Critical Points of Emulsification in Oil-Soap Emulsions—Kyser and Vilbrandt ... 392
Oil of Achillea Millefolium, L. 1922—Kremers ... 399
Bibliography of Pharmaceutical Research—DuMez ... 402
The Arsenical Solutions. No. 2—Langenhan ... 408
Teaching the Use of the Mortar—Baker ... 417
A Brief Discussion of the Ionic Theory in Its Relationship to Certain Life Processes—Wilson ... 418
Making More Cordial the Relationship Between Doctor and Druggist—Beard ... 422
Building Up A Pharmaceutical Practice On Scientific Lines Where Competition Will Find It Difficult To Follow ... 424
A Hospital Pharmacy—Goeckel ... 428
The Department of the American Conference of Pharmaceutical Faculties ... 430
The Development of a Course in "Commercial Pharmacy"—Bradley ... 430
The Commonwealth Study of Pharmaceutical Education ... 433
A Census of Pharmaceutical Research—Arny ... 434
Committee Reports ... 444
National Committee on the Pharmaceutical Syllabus ... 444
Membership of the Pharmaceutical Syllabus Committee ... 444
Proceedings of the Local Branches ... 447
Editorial Notes ... 452
Obituary ... 455
Societies and Colleges ... 456
The Pharmacist and the Law ... 460
Book Notices and Reviews ... 462
Advertising—Cover pages 2, 3 and 4 and pp. I-XXII

Published Monthly by the American Pharmaceutical Association: Office of publication, 211 Church St., Easton, Pa. Editorial Office, 253 Bourse Building, Philadelphia, Pa. Annual Subscription, $4.00; Single Numbers, 35 Cents.

THE SEVENTY-THIRD ANNUAL CONVENTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN DES MOINES, IA., DURING THE WEEK OF AUGUST 24, 1925.

The 1925 Meetings of the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will also be held in Des Moines, during the week of August 24, 1925.

For Association Roster, see pages x, xii and xiv.

Entered as second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103. Act of October 3, 1917; authorized July 10, 1918

MARINOL

the new original cod liver oil, homogenized

with extracts of marine algae—Fucus Vesiculosus, Chondrus crispus and concentrated sterile deep-sea-water.

MARINOL

is really delicious and digestible.

MARINOL

8 oz. bottles. Per dozen, $8.00. *Of all Wholesale Druggists.*

Made by

FAIRCHILD BROS. & FOSTER **New York**

Free goods in May **Through your jobber**

ZINC STEARATE MERCK

"The Pkg. with the ducks" **Send for dealer helps**

TRADE MARK

PERALGA

Reg. U. S. Pat. Off.

NEW-TYPE NON-NARCOTIC ANALGESIC-SEDATIVE

"Headaches" due to menstrual, climacteric disorders, nervous conditions, hysteria, mental exhaustion from overwork, migraine, hemicrania, eyestrain.

Dysmenorrhea.

Menorrhalgia.

Pains of the acute gallstone attack.

Insomnia due to pain.

PALLIATE PAIN WITH PERALGA

Traumatic pain following injury or surgical operations.

Malignant tumor pains.

Pains of tabes.

Substitute for morphin and other opiates.

Drug withdrawal cures.

In support of general and local anesthesia.

Extensively and continuously Advertised and sampled to the Medical and Dental Professions.

SCHERING & GLATZ, Inc.

150-152 Maiden Lane, NEW YORK. **705 Unity Building, MONTREAL.**

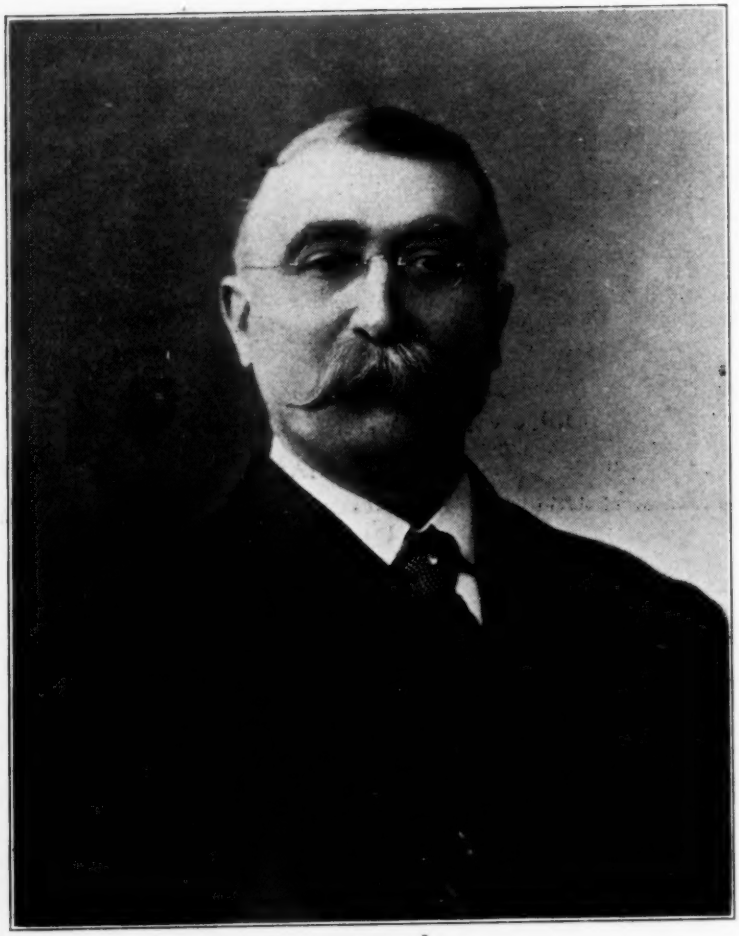
Manufacturing Laboratories, BLOOMFIELD, N. J.

JOHN GRANVILLE GODDING

BOSTON, MASS.

President of AMERICAN PHARMACEUTICAL ASSOCIATION, 1911–1912

Member A. PH. A. since 1875



JOHN G. GODDING.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XIV MAY, 1925 No. 5

JOHN GRANVILLE GODDING.

John Granville Godding was born in Gardiner, Maine, the son of Nathaniel and Rachel H. Godding. During his youth he spent several years in Brandon, Vermont, finishing his schooling and working for an uncle who was a druggist. Afterward, he went to Rutland, Vermont, to work for A. W. Higgins. In 1871, he came to Boston and entered the Massachusetts College of Pharmacy, securing a position with Edward S. Kelley, who conducted one of the leading drug stores in the city at that time. Mr. Godding completed the College course and was graduated in 1874, when he was twenty-one years old. After his graduation, he remained with Mr. Kelley for some time and became well acquainted with Samuel A. D. Sheppard, who induced him to join the AMERICAN PHARMACEUTICAL ASSOCIATION at the *Boston meeting in 1875*. He then went to Philadelphia where he worked in the store of Henry A. Borell for about two years.

In 1877 Mr. Godding returned to Boston and entered the employment of Levi Tower with whom he remained for about six years, during which time he was married, in 1880, to Adelaide M. Smith, of Epping, New Hampshire. Mrs. Godding has ever been his constant and interested co-worker in many activities. In 1884, Mr. Godding and his employer, Mr. Tower, formed a partnership and opened a drug store at the corner of Dartmouth and Newbury Streets, near Copley Square, in the then new and later exclusive Back Bay district of Boston. In 1894, Mr. Tower withdrew from the firm and since that time Mr. Godding has conducted this high-grade pharmacy at the same location.

Mr. Godding has always been a highly professional pharmacist of the old school, but he is also keenly businesslike in all things and early realized the need of organizations to look after the varied interests of pharmacy, and also his duty to support and serve such organizations. Perhaps his most enduring work in this line has been for the Massachusetts College of Pharmacy, which he joined in 1881. In 1886 he was elected a trustee of the College and he has served as its treasurer since 1890. He has been one of the leading members of the group of men whose conduct of the Massachusetts College of Pharmacy has resulted in the remarkable

progress of that institution during recent years. In 1924, on the fiftieth anniversary of his graduation, the College conferred the honorary degree of Doctor of Pharmacy upon Mr. Godding in appreciation of his long and helpful service to the institution. Mr. and Mrs. Godding have been regular attendants at the meetings of the AMERICAN PHARMACEUTICAL ASSOCIATION for many years and Mr. Godding served as President of the ASSOCIATION in 1911–1912. He is a member of many other organizations, including the National Association of Retail Druggists and its Boston branch, the Massachusetts State Pharmaceutical Association, the Boston Druggists' Association, and the Boston Chamber of Commerce.

Mr. Godding is companionable, but he is of a quiet and reserved disposition, and it is his habit to listen carefully to the discussion of a question before adopting his attitude on it. Those who have worked with him have learned that he is seldom on the wrong side of a question, which gives them great confidence in his judgment, and he has attained to a position of leadership among those active in pharmaceutical affairs in Massachusetts and the rest of New England. In his service to pharmaceutical organizations, he thinks only of the good of the cause and asks nothing for himself. This, however, is the type of man that we delight to honor and Mr. Godding has held offices of responsibility and trust in many organizations.

T. J. BRADLEY.

ALL ARE A PART OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

HEADQUARTERS BUILDING WILL BENEFIT EVERY ONE.

BY HENRY M. WHELPLEY.

During the last year practically all pharmacists, whether they be retailers, wholesalers, or manufacturers, have rapidly come to the realization that they are a part of the AMERICAN PHARMACEUTICAL ASSOCIATION. Yes, each and every one who practices pharmacy in any way to-day is a part of the A. PH. A.

The seventy-two years of work by the AMERICAN PHARMACEUTICAL ASSOCIATION has developed and saved to pharmacists all that distinguishes the retail druggist from the hardwareman or the hand-me-out-eat-shop proprietor. It is the A. PH. A. part of the pharmacists which justifies the expressive slogan, "Your druggist is more than a merchant." It is the A. PH. A. blood in our commercial veins which makes it safe for the general public to "Try the drug store first."

The A. PH. A. work began in 1852 and continues uninterrupted to-day. This Association operates on an altruistic basis, free from politics.

The present-day concern of the organization outside of the routine work is to render the benefits of the A. PH. A. accomplishments more available to the general masses of retail druggists. The A. PH. A. should appeal to druggists of every capacity and occupation. Even as it is now, each and every one breathes the atmosphere of the A. PH. A. and daily realizes in a financial, if not a mental, way on what has been done for pharmacy by the Association in nearly three-quarters of a century.

Many say that they do not belong to the A. PH. A. Perhaps not, but that is an anomaly for all are a part of it and it is a part of all, in spite of all protests.

Some may be like a bank with only a receiving teller, but the A. PH. A. accomplishments, like money, is the all essential to our very existence.

We may resist joining, as a child may run away from home, but we cannot avoid being a part of the A. PH. A. as long as we are pharmacists, any more than a run-away child can cease to be a member of the family, unless death severs the physical relation.

Having attended forty consecutive meetings of the A. PH. A. and taken part in the various activities, I can write knowingly as well as feelingly.

The A. PH. A. is the only national organization in which all drug interests have an equal right and a mutual interest; the only one out of ten national drug organizations in operation to-day.

Napoleon was one of the first great leaders to recognize the practical value of the science of chemistry. Now Chemistry holds a commanding position in the thoughts and lives of men and nations.

The drug journals have been filled with statements of what the A. PH. A. has accomplished. Who will be the Napoleon of the retail drug trade, to recognize the practical every-day value of having a Pharmacopœia, a National Formulary, Drug laws, Colleges, Boards, the N. A. R. D., the A. C. P. F., the N. A. B. P., A. D. M. A. and many other things that go to make up the conditions in drugdom?

Someone is needed who can humanize the past of the A. PH. A. as Wells has humanized the history of man from his very beginning. Someone should make us thirst for a more intimate knowledge of the A. PH. A. and realize the full bearing it has on our present and our future.

The AMERICAN PHARMACEUTICAL ASSOCIATION has always been actively at work doing many things for the benefit of Pharmacy as a whole. At the present time its greatest effort is toward the establishment of a great central Headquarters Building which may serve all of Pharmacy. The success thus far attained on this project will stand for all time as one of the remarkable achievements of Pharmacy.

The successful completion and operation of the Headquarters Building will be of great benefit to every one connected with pharmacy in any way. All who have not already done so should therefore subscribe to that fund now.

BRICKS WANTED TO BUILD A HOME FOR AMERICAN PHARMACY.

BY EDWARD SWALLOW.

Every worthwhile man builds a home for himself and family, in which abode he shelters those he loves. As the song says, "Home, sweet, sweet home," "There's no place like home."

Next to family love, comes the love of a profession, the work one does in rendering service to the community that requires much learning and science. In this regard we have a very large family of pharmacists here in America. A family, old indeed, and forever increasing. But, strange to say, the large number of children of Pharmacy, has no home, no place wherein they can meet together under one roof—an edifice common to and representing American Pharmacy as it is to-day and will be.

In olden times men helped each other build homes, the community spirit was strong among them. No man is forced to be a pharmacist—he is so by his own choice—therefore he must love his profession. Love means helpfulness, and individual service and sacrifice, if need be.

Your profession needs a dignified home, a Headquarters, worthy of an ancient and honorable calling; bricks are wanted to do this. Every pharmacist should send in his subscription. The more bricks, the better.

EDITORIAL

E. G. EBERLE, EDITOR 253 Bourse Bldg., PHILADELPHIA

ARE YOU KEEPING UP YOUR END?

HERMAN J. STICH, in one of his "Two Minutes of Optimism," asks the question of his readers—"Are You Keeping Up Your End?" He then refers to the tillers of the soil who toil so that there may be food to eat and clothes to wear. Countless human beings are working in the mines so that there may be fuel, steel structures, messages carried around the globe and, in like manner, the results of other activities for our needs, comfort, health and joy are depicted, leading up to the question—"Are you doing your share to justify this tremendous outlay of energy and wealth?" "Are you reciprocating?" "Are you playing fair?" "Are you keeping up your end?" The questions are asked with greater detail, but as stated here they enable us to ask ourselves individually—"Am I doing my best and very utmost to keep up my end?" Perhaps none of us are, but there are some wholly indifferent to the needs of pharmacy and what others are doing so that pharmacy may receive recognition as a needful and useful profession and pharmacists be deemed worthy of special privileges.

The druggist is not playing fair when he withholds his support from his State Association. It is through the workers within that organization he is enabled or has the opportunity to make a living, to maintain a professional or business standing in his community. In a business transaction such an individual does not expect to receive something for nothing, but the vision of some is obscured regarding association membership. There can be no question about the fact that State associations have helped the individual. There may be too much team-work, too much conformity in association endeavor, but an organization is subject to a definite law of averages and represents the needs of the individual; the individual is not denied his own views within the association.

Abraham Lincoln said: "I like to see a man proud of the place in which he lives. I like to see a man who lives in it so that his place will be proud of him. Be honest, but hate no one; overturn a man's wrong-doing, but do not overturn him unless it must be done in overturning the wrong. Stand with a man while he is right, and part with him when he goes wrong." The foregoing quotation is applicable to the subject; the right of a pharmacist to carry on his profession without being subject to the code of ethics governing the State association members, for the protection of the public and of pharmacy, may rightfully be questioned; at any rate he should have pride in his profession and so conduct himself that he will reflect credit upon pharmacy. This is particularly true at this time when the number of drug stores is increasing.

The Constitution and By-Laws of State associations are certainly liberal enough for any pharmacist who seeks to serve. His desire to specialize is in no way restricted by his membership, so long as the code of ethics guides his actions. Supervision of the individual protects the public and it might be well if closer super-

vision over the members was more in evidence; although the widest differences of opinion and interpretation should be provided for, flagrant violation of the code of ethics should meet with expressed disapproval.

This comment is for the encouragement of a larger representative membership in State associations which, during the next few months, will convene in annual sessions. E. G. E.

COMMENCEMENTS.

EACH year adds to the list of pharmacy school graduates. All of them exert an influence for pharmacy; most of them retain filial attachment with the institution wherein they were prepared for life's work. This relation, which is in evidence during commencement week, should be maintained. Not only is the school or college concerned in its alumni, but the latter continue to benefit by the progress of the Alma Mater; if the latter is among the leaders the honor is shared by its alumni; there is no standstill, and this is applicable to both, therefore, their duty is plain—the commencement day addresses usually carry the message. The responsibilities should be impressed, for a realization of them, or an indifference to them, signifies either an asset or a liability. Selfishness and greed are obstructions in the path of pharmaceutical progress.

Pharmacy schools and colleges aim to train the students in the sciences and arts underlying pharmacy, and to implant observing and studious habits in the young men and women; for, after all, few of them know, before graduation, what particular line of work they will follow. The trend of pharmacy schools, as of medical schools, is to train the students in the essentials and to awaken interest along lines which offer opportunities for them, and group the student body accordingly.

The thoughts and acts of the young men and women are influenced by those who teach them, not only during the years of college life but in after years; the inference has been heard or made use of by nearly everyone at some time or other that an alumnus of this or the other educational institution may be known by some characteristic quality.

Learning from others should be a purpose throughout business and professional life. Nearly every one, by contact, imparts to others a knowledge of something, if observation is cultivated. It has an important part in learning, thinking and doing, in the success of individuals, and in shaping the affairs of all professions and business.

Alumni represent an asset or liability to the institution in which they have been trained, and also to the profession in which they are engaged; in a degree, the institution has a related value to its alumni. Commencements mark events in the lives of men and women and of the activities in which they are engaged—they are periods for perlustration. E. G. E.

ANESTHETIC PROPERTIES OF THE OLEFINE HYDROCARBONS, ETHYLENE, PROPYLENE, BUTYLENE AND AMYLENE.*

BY LLOYD K. RIGGS.

In view of the great numbers of new drugs that have, within recent decades, been introduced into nearly every field of medicine, it is very surprising that, previous to 1923, a period of some sixty years had elapsed during which no new general anesthetic, applicable by inhalation, was introduced which gained any very general recognition by the medical profession. In 1923 Luckhardt and Carter[1] reported experiments carried out at the University of Chicago, which showed that ethylene ($H_2C = CH_2$) gas possesses marked anesthetic properties and that it may be safely applied in surgical operations on animals and man. In the same year Brown[2] working in the University of Toronto reported the anesthetic action of ethylene on laboratory animals. These preliminary announcements have been actively followed by many investigators and clinicians, until now, ethylene is in use as a general anesthetic in many hospitals, clinics, and in the offices of many dentists. There can be no doubt, as shown by Luckhardt and Carter, but that ethylene is a more potent anesthetic than nitrous oxide. It, however, appears to be quite true that relaxation obtained with ethylene is generally less complete, than that obtained with ether or with chloroform.

Prior to the above quoted observations ethylene was known to possess anesthetic properties.[3] It is, however, quite certain that the early workers with ethylene not only failed to appreciate its value, but were quite generally in error in their observations. For example: Richardson[4] (1885), states that 10% to 15% concentrations of ethylene in air produce anesthesia, while it is now well known that ethylene is far from effective in such concentrations.

Propylene ($H_3C.HC:CH_2$), the olefine hydrocarbon next higher than ethylene, resembles ethylene in that it possesses anesthetic properties. That propylene is a more potent anesthetic than ethylene has been shown by a number of observers. Meyer and Hopff,[5] report that 50% propylene and 50% air induces anesthesia in white mice in eight minutes. Halsey, Reynolds and Cook[6] report that propylene is "three times as powerful an anesthetic agent as ethylene." Brown,[7] working on cats, found that anesthesia is induced by 37% to 50% propylene.

Butylene, the olefine hydrocarbon next higher than propylene, occurs in three isomeric modifications, *viz.*, ethyl-ethylene $H_3C\text{-}CH_2CH = CH_2$ (b. p. $-5°$), sym.

---

* Scientific Section, A. PH. A., Buffalo meeting, 1924.

[1] Luckhardt and Carter, *J. A. M. A.*, 80, 765 (March 17, 1923).

[2] Brown, *Canadian M. A. J.*, March, 1923.

[3] Review of early literature of the subject is found in paper by Luckhardt and Carter and Lewis, "Clinical Experiences with Ethylene Oxygen Anesthesia," *J. A. M. A.*, Vol. 81, p. 1851.

[4] Richardson, *Scientific American Supplement*, No. 515, p. 8227, Nov. 14, 1885.

[5] Meyer and Hopff, *Hoppe Seylers Zeitschrift für Physiologische Chemie*, Vol. 126, p. 281 (1923).

[6] Halsey Reynolds and Cook, *New Orleans Medical and Surgical Journal*, July, 1924.

[7] Brown, *Journal of Pharmacology and Experimental Therap.*, July, 1924.

dimethyl-ethylene $H_3C\text{-}CH = CH\text{-}CH_3$ (b. p. $+1°$) and unsym. dimethyl-ethylene $(CH_3)_2\,CH = CH_2$ (b. p. $-6°$). We have not found in our admitedly incomplete survey of the literature any references to the physiologic action of these hydrocarbons, but in view of the fact that other olefine hydrocarbons possess such well-defined anesthetic properties, such physiologic action could be surely predicted for butylene.

The next higher member of the olefine series is amylene which occurs in six isomeric modifications as follows: (1) α-amylene ($H_3C.H_2C.H_2C.HC:CH_2$), b. p. $+39°$; (2) α-isoamylene $(H_3C)_2.CH.HC:CH_2$), b. p. $+21°$; (3) β-amylene ($H_3C.H_2C.HC:CH_2.CH_3$), b. p. $+36°$; (4) γ-amylene $H_3C.\begin{matrix}H_2C\\H_3C\end{matrix}\!\!>\!C:CH_2$, b. p. $+31°$; (5) β-isoamylene ($(H_3C)_2.C:CH.CH_3$), b. p. $+36°$; (6) Tetramethyl-ethylene ($(H_3C)_2.C:C.(CH_3)_2$), b. p. $+73°$.

Amylene, probably isoamylene,[1] was introduced into medical practice by John Snow[2] in 1885 and is characterized by May[3] as resembling chloroform in its narcotic action. Foy[4] states that the condition of insensibility produced by the inhalation of amylene vapor is less persistant than that produced by chloroform, and that muscular spasms are likely to occur under its influence. Richardson[5] considers the anesthetic value of amylene as doubtful on account of the "short but sharp second or spasmodic stage" of anesthesia and because amylene apparently "caused two deaths in 238 administrations."

In striking contrast with the pronounced nervous symptoms or excitement stage produced by amylene, is the absence of excitement stage of ethylene anesthesia in some individuals and its mild character in others.[1]

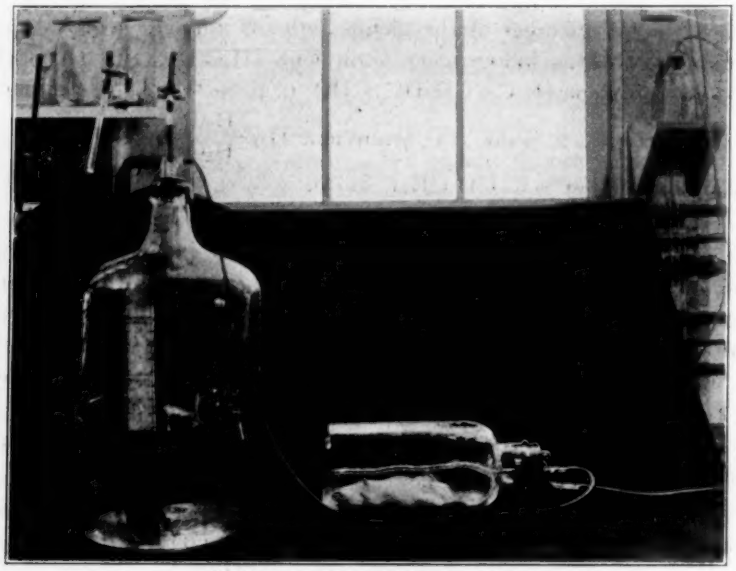
In view of the information thus briefly outlined, it appeared important that a comparative study of the physiologic properties of various unsaturated hydrocarbons be undertaken. In order to make these studies as strictly comparable as possible it is necessary to have hydrocarbons of high and known purity and also large numbers of standard animals. The pure materials were supplied through the coöperation of Dr. Paul Giesy, Dr. W. E. Tapley and Mr. A. E. Remick of the Brooklyn Research Laboratories of E. R. Squibb & Sons. These chemists supplied propylene, butylene, and amylene of better than 99% purity. The animals chosen were white rats (100 to 150 Gms. weight) of pure strain and great uniformity, supplied by Mr. E. V. B. Douredoure of Germantown, Pa.

Ethylene, propylene and butylene are gases at ordinary room temperatures and the method employed in a study of their physiologic properties was to make mixtures of these gases with oxygen and nitrogen in various proportions in spirometers. The gas mixture of the spirometer was then analyzed and corrected to a desired composition. A wide-mouthed bottle of about five liters capacity, used as a respiration chamber, was then filled, by displacing water with gas from the spirometer, and after an experimental animal had been quickly introduced into the bottle,

---

[1] "Richter's Organic Chemistry," Vol. 1, p. 92 (1899).
[2] Snow, *Medical Times and Gazette*, Vol. 14, p. 60, et. seg. (1857).
[3] May, "The Chemistry of Synthetic Drugs," London, 1921.
[4] Foy, "Anesthetics Ancient and Modern," London, 1889.
[5] Richardson, *Scientific American Supplement*, No. 515, p. 8227, Nov. 14, 1885.

it was closed with a tightly fitting rubber stopper, equipped with a gas inlet tube extending nearly to the bottom of the bottle and an outlet tube passing just through the stopper. A flow of gas from the spirometer was continued during the experiment. A manometer was also connected with the respiration chamber and atmospheric pressure maintained therein. (See illustration.)



Amylene is an extremely volatile liquid boiling at 37° C., hence the above method was not easily applicable and experiments with this hydrocarbon were carried out by placing an animal in a large-mouthed bottle (5 liters) filled with air. This bottle was then closed with a tightly fitting rubber stopper through which passed a manometer tube and a short glass tube the inside end of which was covered with a rubber diaphragm. A known quantity of amylene was then taken up in a calibrated luer syringe (both syringe and amylene cooled to 15° C.) and the needle forced through the diaphragm. A known quantity of amylene was thus introduced into the bottle without loss. The concentration of amylene in the bottle could then be calculated from the known volume of the bottle and the amount of amylene introduced and also from the temperature and increase of pressure recorded by the manometer. Calculations by these two methods checked within $^1/_4\%$ volume of amylene gas in the bottle.

The behavior of animals exposed to various concentrations of the several hydrocarbons could then be observed.

In arranging and carrying out our experiments we have had especially in mind the establishment of the following bits of information.

1. The symptoms produced in experimental animals by the inhalation of each of the first four hydrocarbons of the olefine series.

2. A quantitative comparison of the anesthetic potencies of these hydrocarbons.

3. The toxic action of each hydrocarbon.

ETHYLENE.

The physiologic action of ethylene is so well known that the experiments which we have carried out were merely for purposes of comparison with the less well-known hydrocarbons. We have confirmed the findings of Luckhardt and Carter[1] that white rats are anesthetized in about 20 minutes by a gas mixture consisting of 90% ethylene and 10% oxygen, and that no excitement stage or at most, only very slight nervous symptoms accompany the induction of anesthesia with this gas mixture. It may be well to point out that the anesthesia induced in white rats by 90% ethylene is very light, *i. e.*, relaxation is incomplete. Animals exposed to a mixture of 95% ethylene and 5% oxygen are deeply anesthetized within a few seconds and are fairly well relaxed. Continued exposure to a gas mixture containing 95% ethylene and only 5% oxygen quickly produces a marked cyanosis and depression. It is, however, impossible from our experiments to say just how much of the obvious toxic action of this gas mixture is due to the effect of ethylene and how much is due to oxygen privation.

PROPYLENE.

When a rat is introduced into a gas mixture of 60% propylene, 25% oxygen and 15% nitrogen the following series of symptoms are noted. The animal very quickly becomes incoördinate. This condition becomes rapidly more pronounced until the animal is unable to stand and make purposeful movements, the wink reflex is retained and the muscle tone is normal or slightly above normal. In this condition the animal surely feels no pain, for it does not respond to such stimuli as clipping off pieces of its tail. It is indeed, in a distinctly analgesic condition, which deepens on continued exposure to the propylene gas mixture, into a profound, rather well relaxed surgical anesthesia. The absence of excitement stage or marked nervous symptoms during the induction of propylene anesthesia is just as marked as in the case of anesthesia induced by ethylene. Propylene is obviously a more potent anesthetic than is ethylene.

In order to compare accurately the anesthetic potencies of two such gases as ethylene and propylene it is necessary to take into account the concentration of the gas tested, the time of exposure, the animals used and a definite easily recognized physiological condition to which reference may be made. The action of 90% ethylene has been chosen as a standard of comparison. This concentration of ethylene with 10% oxygen at 18° to 20° C. and 760 mm. pressure produces light anesthesia in a white rat (100 to 150 grams) in 18 to 22 minutes. A concentration of propylene which mixed with 10% oxygen produces the same physiologic state within the same time may then be said to be of equal anesthetic potency, and if the potency of ethylene be taken as unity, the potencies of ethylene and propylene may then be expressed as the ratio of their equally effective concentrations.

A considerable number of experiments with various concentrations of propylene are summarized in the following table. For purposes of comparison the action of 90% ethylene is described in the first space of this table.

[1] Luckhardt and Carter, *J. A. M. A.*, 80, 765 (March 17, 1923).

TABLE I.

Gas mixture.	Anesthetic properties.	Toxicity.
Ethylene 90% Oxygen 10%	Light anesthesia in 18 to 20 minutes. No excitement stage or hyperexcitability	No toxic symptoms within three hours exposure.
Ethylene 95% Oxygen 5%	Deep anesthesia within 1 minute, well relaxed.	Marked cyanosis and depression.
Propylene 40% Oxygen 25% Nitrogen 35%	Light anesthesia within 15 to 20 minutes. No excitement stage or hyperexcitability.	No toxic symptoms within six hours exposure.
Propylene 40% Oxygen 10% Nitrogen 50%	Light anesthesia within 15 to 20 minutes. No excitement stage or hyperexcitability.	No toxic symptoms within three hours exposure.
Propylene 55% Oxygen 25% Nitrogen 20%	Deep anesthesia in 3 to 6 minutes. No excitement stage or hyperexcitability.	No toxic symptoms. Animals anesthetized for 7.5 hours recover within 2 minutes and show no bad after effects.
Propylene 65% Oxygen 25% Nitrogen 10%	Deep anesthesia in 2 to 5 minutes. No hyperexcitability.	Respiration rate gradually slowed. Respiratory failure after about two hours exposure.
Propylene 70% Oxygen 25% Nitrogen 5%	Deep anesthesia in 1 to 3 minutes. No hyperexcitability.	Respiratory failure in 20 to 25 minutes. Heart action strong.

Reference to the above table indicates that propylene in a concentration of 40%, with either 10% or 25% oxygen, almost exactly duplicates the physiologic properties of 90% ethylene. The two gases, in these concentrations, may then be said to be of equivalent anesthetic potency or the potency of propylene is related to the potency of ethylene as 40 is to 90, *i. e.*, $\frac{90}{40} = 2.25$. The anesthetic potency of propylene is thus shown to be 2.25, when refered to the potency of ethylene as unity.

It is interesting to note that the quantitative relationship between the potencies of ethylene and propylene is apparently (within narrow limits at least), independent of the oxygen content of the gas mixture. This is being investigated.

It will also be noted from Table I that, if a rat (100 to 150 grams) is exposed to a 70% concentration of propylene mixed with 25% oxygen and 5% nitrogen, death due to respiratory failure occurs in about twenty minutes. Death in this case is evidently due to toxic action of propylene on the respiratory center and is not complicated by the factor of oxygen starvation.

BUTYLENE.

The next member of the olefine hydrocarbons studied was butylene made from normal butyl alcohol and hence probably either ethyl-ethylene $H_3C\text{-}CH\text{-}CH = CH_2$ or dimethyl-ethylene $H_3C\text{-}CH = CH\text{-}CH_3$ or a mixture of these two butylenes.

Animals were exposed to various concentrations of butylene, and the observations made, are recorded in the following table, Table II.

TABLE II.

Gas mixture.		Anesthetic properties.	Toxicity.
Butylene Oxygen Nitrogen	15% 25% 60%	Confusion and incoördination only. Marked nervous hyperexcitability.	Very obvious disturbance of nervous mechanism of the animals but no bad after effects.
Butylene Oxygen Nitrogen	20% 25% 55%	Deep anesthesia in 8 to 15 minutes. Definite nervous hyperexcitability.	Respiratory failure after about two hours exposure.
Butylene Oxygen Nitrogen	30% 25% 45%	Very deep anesthesia in 2 to 4 minutes. Nervous hyperexcitability of brief duration.	Respiratory failure after about forty minutes exposure.
Butylene Oxygen Nitrogen	40% 25% 35%	Profound anesthesia in about $^1/_2$ minute. No nervous symptoms observed. Respiration slowed and weakened.	Respiratory failure after 10 to 15 minutes exposure.

It will be noted from Table II that butylene differs from both ethylene and propylene in that the induction of anesthesia by butylene is accompanied by a marked excitement stage, which is shown by marked nervous symptoms, jerking, twitching, spastic contractions of the leg and back muscles and a general heightened response to various external stimuli, such as a sudden rap on the table or respiratory chamber which will cause a sharp contraction of the muscles of an animal which is lightly anesthetized and beginning to slowly relax into the surgical stage of anesthesia.

It may also be pointed out from the above table (Table II) that the nervous reactions produced by butylene are best observed when animals are exposed to the lower effective concentrations of butylene. This of course does not mean that the higher concentrations of butylene fail to produce an excitement stage, but probably that the excitement stage produced by higher concentrations of butylene is of such short duration as to be not readily observed. It may be well to note in passing that we have found that the nervous symptoms produced by any anesthetic may, quite generally, be best observed in animals which are exposed to a minimum effective concentration of the anesthetic.

Butylene does produce a true, fairly well relaxed anesthesia. A concentration of 20% being effective in 10 to 20 minutes. Butylene at 20% is therefore approximately equivalent, in spite of the qualitative differences in its action, to 40% propylene and 90% ethylene. The anesthetic potency of butylene may then be expressed: $\frac{90}{20} = 4.5$, *i. e.*, butylene is 4.5 times as potent an anesthetic as is ethylene.

When animals are exposed to higher concentrations of butylene say 40% butylene mixed with 25% oxygen and 35% nitrogen, death occurs in about twelve minutes. The death mechanism of butylene is apparently respiratory failure, although the heart action appears to be extremely weak at the time that respiratory failure occurs. This contrasts strongly with the fact that heart action appears to be usually quite strong when respiratory failure induced by propylene occurs. A toxic action of butylene on the heart as well as the respiratory center is thus suggested, although further study of the problem is necessary.

AMYLENE.

Isoamyl alcohol was used in the preparation of our amylene which boiled at 35–37° C. and had a specific gravity of 0.655 $(\frac{15}{4})$. The material analyzed 99.6% pure, by the bromine absorbtion method. No further tests for identity were carried out, but the material is probably nearly all β-isoamylene.

Animals were exposed to various concentrations of amylene and the results obtained are recorded in the following table.

TABLE III.—AMYLENE.

Gas mixture.	Anesthetic properties.	Toxicity.
Amylene 5.44% in Air	Incoördination only. Marked hyperexcitability.	No marked toxic symptoms.
Amylene 5.78% in Air.	Light anesthesia in about 20 minutes. Marked nervous hyperexcitability.	Animals are easily thrown into convulsions.
Amylene 6.12% in Air.	Deep anesthesia in 6 to 15 minutes. Marked nervous hyperexcitability.	Respiratory failure after about one hour's exposure. Death in convulsions may, however, intervene within 30 to 45 minutes.

Reference to this table indicates that the physiologic properties of amylene are more like those of butylene than like the properties of propylene and ethylene. The excitement stage produced by amylene is still more marked than that produced by butylene. Some individuals were so markedly hyperexcitable that a sudden rap on the table or respiratory chamber was a sufficient stimulus to throw a lightly anesthetized animal into convulsions, which in two of some two hundred amylene anesthesias terminated in death. This is of course far from being the usual death mechanism for amylene. Long exposure to even moderate concentrations of amylene produces respiratory failure and heart action at the time of respiratory failure is very feeble, in many instances it indeed appears that the heart and respiratory center fail almost simultaneously.

The toxic action of amylene appears to be quite similar to that of butylene except that amylene is more powerful in its toxic actions and appears more definitely, to act on the heart.

In spite of the nervous symptoms produced, fairly well relaxed anesthesia is produced in white rats by 15 to 20 minute exposure to 6% amylene in air. This concentration of amylene is therefore equivalent to 90% ethylene, 40% propylene and 20% butylene. The anesthetic potency of amylene may therefore be expressed by the ratio $\frac{90}{6} = 15.0$. Amylene is fifteen times as potent an anesthetic as is ethylene.

It is apparent from the preceeding data, that the anesthetic potencies of the first four members of the olefine series of hydrocarbons, increases concomittantly with an increase of molecular weight. A similar relationship between the toxicity and molecular weight of alcohols of the paraffin series (Richardson's Law), was announced by Richardson,[1] 1869, and has since been studied by numerous investi-

[1] Richardson, *Medical Times and Gazette*, Vol. 2, p. 705 (1869).

gaters, notably Macht[1] who has summarized previous work on the subject and pointed out that the iso alcohols are less toxic than the normal alcohols. Macht's figures for the toxicity of alcohols are as follows: ethyl 1, propyl 2.5, isopropyl 2.0, butyl 16.6, isobutyl 5.5, amyl 33.2 and isoamyl 19.2. Evidence has been presented above, which indicates that there is an increase of the toxicity as well as the anesthetic potency of the olefine hydrocarbons, with the molecular weight. Only the potencies of the olefines have, however, been related quantitatively and we have no evidence that potency and toxicity are identical functions of the molecular weight. Nevertheless, it is of interest to note that the increase of toxicity of alcohols with their molecular weight, is of the same order as the increase of potency observed for the olefines. It is, of course, quite probable that considerable differences might be observed in the properties of the various isomeric butylenes and amylenes.

Aside from ethylene, propylene is the only olefine studied which apparently deserves further consideration as an anesthetic agent. Both butylene and amylene are more potent than ethylene and propylene, but the nervous symptoms which they induce probably excludes them from consideration. The fact that propylene causes slight, if any, nervous symptoms and is more potent than ethylene, so that it may be administered together with larger amounts of oxygen, seems to favor the introduction of propylene.

It should, however, be noted that none of the hydrocarbons studied produce relaxation comparable to that obtained by ether and chloroform, except when the gas is administered in such concentrations as to produce marked depression.

SUMMARY.

1. The first four hydrocarbons of the olefine series all possess anesthetic properties. Ethylene and propylene cause no marked nervous symptoms or excitement stage. Butylene and amylene produced a marked excitement stage of anesthesia, amylene being more powerful in this respect than butylene.

2. Ethylene 90%, propylene 40%, butylene 20% and amylene 6% induce light anesthesia in white rats (100 to 150 grams) in 15 to 22 minutes and may therefore be said to be of equivalent anesthetic potency. On the basis of the anesthetic potency ethylene as unity, the potencies of the four olefines studied are, ethylene = 1, propylene = 2.25, butylene = 4.5 and amylene = 15.

3. The general mechanism by which the olefines cause death is respiratory failure, *i. e.*, their chief toxic action is on the respiratory center. Butylene and amylene may, however, have an additional toxic action on the heart.

4. Propylene on account of its high anesthetic potency and its failure to cause nervous symptoms is worthy of further consideration as a clinical anesthetic.

The author wishes to express his sincere thanks to Dr. Paul Giesy, Mr. A. E. Remick and Dr. W. E. Tapley for their assistance in the preparation of the hydrocarbons used in these studies; to Mr. Harold D. Goulden and Miss Helen Schipmann for their assistance in the experimental work and to Mr. F. W. Nitardy for numerous helpful suggestions.

RESEARCH LABORATORIES,
E. R. SQUIBB & SONS, NEW BRUNSWICK, N. J.

[1] Macht, *Journal Pharm. and Exp. Ther.*, Vol. XVI, p. 1 (1920).

SOME PHYSICAL CONSTANTS OF ACETYLSALICYLIC ACID.

BY J. L. HAYMAN, L. R. WAGENER, AND E. F. HOLDEN.

HISTORICAL.

The literature contains many articles upon the melting point of acetylsalicylic acid in which the figure of this physical property is given as low as 118° C. and as high as 139° C. The abstract of the U. S. P. X as published December 1923 THIS JOURNAL[1] states that the melting point of acetylsalicylic acid "when determined in a bath preheated to 120° C. is not below 132° C.," and "that it should contain not less than 99.5 per cent of absolute acetylsalicylic acid." "New and Nonofficial Remedies," 1923, states that it "melts between 130° and 133° C., according to the U. S. P. method, modified by first heating the bath to 120° C. before immersing the melting point tube in the bath."

Strange as it may seem, of all the articles published upon the subject, comparatively few describe the method used in determining the melting point. Several factors are involved in taking the melting point of acetylsalicylic acid, a few of which are: (1) manner of approaching the melting point, (2) temperature of bath upon immersing melting point tube, (3) use of one or two thermometers (one used as auxiliary), (4) employing stirring device for bath, etc., any one of which may alter the final results. Obviously various methods of approach have been employed and this fact alone no doubt accounts for some of the differences obtained in the melting point of acetylsalicylic acid. It is a factor that cannot be overlooked, especially in a substance like acetylsalicylic acid which apparently melts with some decomposition. Since a substance melting with slight decomposition exhibits no sharp melting point, there is a personal error introduced as to what might be considered the correct melting point.

Francois[2] believes that the exact melting point can be determined by using an oil or paraffin bath, employing two thermometers, one inserted in the bath and the oil raised one degree per minute until a temperature of 125° C. is reached, at which time the second thermometer bearing the melting point tube is immersed, and the determination from this point occupying not more than 5 minutes. By this method he obtained 132° C. as the true melting point of acetylsalicylic acid.

Perhaps the best method that has been devised for the determination of the melting point of acetylsalicylic acid is that described by Dahm,[3] in which he uses an oil-bath equipped with a mechanical stirring device, heating the bath to 130° C. before inserting the melting point tube, obtaining by this method a melting point of 133–135° C. (corrected).[4] Since the work of Emery and Wright[5] shows that a depression of 1 degree is made for every 5 minutes heating just below the melting point, Dahm preheats the bath to 130° C. before immersing the melting point tube.

In redetermining the melting point of the acetylsalicylic acid on which Andrews and Herron[6] reported a melting point of 139° C., Leech[7] found it to be 132–132.5°

---

[1] J. A. PH. A., 12, 102–3 (1923).
[2] *J. Pharm. Chim.*, 15, 213 (1917).
[3] *J. Ind. Eng. Chem.*, 11, 29 (1919).
[4] See U. S. P.
[5] Bureau of Chem., *Dept. of Agr. Bulletin* 162.
[6] *Amer. Drug.*, 67, 85 (1919).
[7] *Reports Chem.*, "Lab. Amer. Med. Assoc.," 12, 63 (1919).

C. when the bath was preheated to 120° C. but on the other hand a melting point of 134.5–135° C. when the bath was preheated to 130° C., confirming the work of Dahm and of Emery and Wright.

There seems to be quite a diversity of opinion as to what really happens at the melting point of acetylsalicylic acid. Tsakalotos[1] claims that 125° C. or even lower is more nearly the correct melting point and that the variation is due to the salicylo-salicylic acid formed by the partial decomposition of the acetylsalicylic acid at the melting point with loss of AcOH. In a more recent paper, Paolini[2] claims that the products of decomposition are AcOH, salicylic acid and a polymolecular salicylide $(C_6H_4CO)_n$.

Capelli[3] in his extensive work upon acetylsalicylic acid while determining the most suitable solvents for crystallization found that this substance when recrystallized from various organic solvents, showed different melting points. In a later paper[4] he ascribes the variation in melting point of acetylsalicylic acid to the water content and not to the presence of any salicylic acid which might be present or formed during melting. The absorbed water supposedly causes partial saponification.

Due to the fact that there is such a diversity of opinion regarding the melting point of acetylsalicylic acid, the apparent melting point of standard commercial samples was determined according to the U. S. P. as modified according to the New and Nonofficial Remedies, to ascertain whether or not we are dealing with a true melting point, and if not, what the products of decomposition may be.

Since, according to Capelli, there is a difference in the melting point of acetylsalicylic acid when recrystallized from various solvents, it was thought expedient to recrystallize some of the standard commercial samples from the various solvents and by studying the crystal forms and optical properties, determine whether or not the crystals obtained were similar.

EXPERIMENTAL.

Six standard commercial samples of acetylsalicylic acid were tested for salicylic acid, in accordance with the "New and Nonofficial Remedies," 1923, as follows:

> "If to a solution of 0.1 Gm. of acetylsalicylic acid in 1 cc. of alcohol, 48 cc. of water is added and then 1 cc. of diluted ferric chloride solution (1 volume of ferric chloride solution to 100 volumes of water), no greater violet coloration will be produced within two minutes than is produced in a parallel test using 1 cc. of a standard solution (0.116 Gm. sodium salicylate in 1 liter) in place of the acetylsalicylic acid."

with results as given in Table I. Table II shows the results of obtaining the melting point, congealing, second melting point, congealing, etc. Table III gives the melting points of six commercial samples of acetylsalicylic acid. Table IV shows the melting points of acetylsalicylic acid recrystallized from organic sol-

[1] *J. Pharm. Chim.*, 14, 174 (1916).
[2] *Giorn. Chim. Ind. Applicata*, 3, 403–5 (1921).
[3] *Giorn. Chim. Ind. Applicata*, 6 (1920).
[4] *Ibid.*, 8 (1920).

vents. The results shown in the tables are typical results from a series of determinations.

TABLE I.—COLOR REACTION.

Sample.	Result.
1	Same as standard
2	More pronounced
3	Less pronounced
4	Less pronounced
5	Less pronounced
6	Same as standard

TABLE II.—MELTING POINT ° C.

First	132.5
*Second	128.0
Third	126.5

TABLE III.

Sample	Melting point (corrected)*.	Purity.
1	134.0° C.	99.82
2	129.0	99.43
3	133.5	99.80
4	133.0	99.82
5	134.0	99.88
6	134.0	99.84

* See U. S. P.

TABLE IV.

Original m. p.	Solvent.	Melting point.
134.8° C.	Chloroform	134.5° C.
134.8	Benzene	134.3
134.8	Carbon Tetrachloride	133.0
134.8	Acetone	135.8
134.8	Alcohol	135.0

MICROSCOPIC EXAMINATION OF THE MATERIAL CRYSTALLIZED FROM ORGANIC SOLVENTS.

BY EDWARD F. HOLDEN.*

Since there was found to be a slight variation in the melting point of crystals deposited from different organic solvents, as shown in Table IV, a microscopic examination of the crystals was thought advisable. This would determine whether the various crystals are actually identical, or whether the small variation in melting points is due to slight differences in composition. The microscopic examination showed that crystals from all five solvents, chloroform, benzene, carbon tetrachloride, acetone, and alcohol, respectively, were crystallographically and optically identical. They had the following properties:

FORM.

Lath-shaped or tabular crystals, persistently lying on a prominent pinacoid face, designated hereafter as *a*. A few crystals rest on another pinacoidal face, approximately perpendicular to *a*, which will be called *b*. Domes lying in the zone *a* have an interfacial angle very close to 60°. Other less frequently noted faces were: (1) the basal pinacoid at *ca*. 89° to the edge between *b* and *a*; (2) another dome in the zone of *a*; and (3) a prism form with two faces. The substance is apparently triclinic, with the axes intersecting approximately at right angles. There are good cleavages parallel to *a* and *b*. Crushed fragments are very flexible shreddy fibers. The figure below shows some of the more common outlines observed under the microscope.

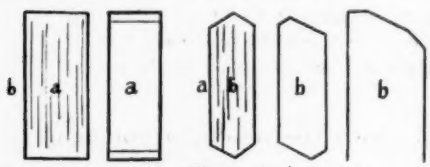


Fig. 1.

* Mineralogical Laboratory.

OPTICAL PROPERTIES OF CRYSTALS FROM DIFFERENT SOLVENTS.

The crystals are colorless.

Indices (for yellow light): α 1.505, β 1.645, γ 1.655, all $\pm$.005. n perpendicular to the laths lying on a = *ca.* 1.565. The double refraction, 0.15, is quite high.

Orientation (Fig. 2). All fragments have apparently parallel extinction, the extinction angle not exceeding 3°. Elongation = Z. X and Y are perpendicular to the elongation and inclined about equally to the prominent face a. α and β are rarely observed, but can be noted on a few of the crushed fibers. The laths generally show γ = 1.655, parallel to their elongation, and n = 1.565, perpendicular to the elongation. The optic axial plane is parallel to the elongation. *Interference Figures:* Laths lying on either a or b show an apparently uniaxial figure, with the optic axis so much inclined as to be entirely out of the field. However, the biaxial character of the figure is shown on very thin laths by the eccentricity of the curves. Fragments showing β and γ give the true biaxial figure, being perpendicular to Bx_a. The optical character is negative, with $2V$ small, and distinct dispersion $\rho < v$.

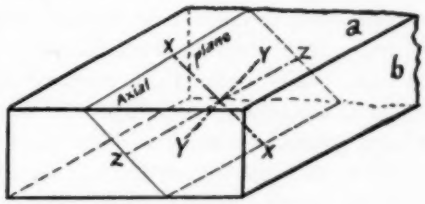


Fig. 2.—Optical orientation.

The assay was carried out according to the directions given in the abstract of the U. S. P. X as follows: "Weigh accurately about 1.5 grams previously dried 3 hours over sulphuric acid, add 50 cc. of $N/2$ NaOH, boil gently for ten minutes, then titrate the excess alkali with $N/2$ H_2SO_4, using 3 drops phenolphthalein T. S. indicator. Each cc. of $N/2$ NaOH corresponds to 0.045027 gram absolute acetylsalicylic acid," modified by using $N/10$ acid instead of $N/2$. The weaker acid was found to give more consistent results, since one drop of $N/2$ alkali introduced quite an appreciable error when dealing with highly pure acetylsalicylic acid. In using the weaker solution the chances for error in this particular case are one-fifth that of the stronger alkali.

DISCUSSION.

It is a well-known fact that with few exceptions, a substance upon melting and congealing should remelt at the same temperature providing decomposition does not take place. With acetylsalicylic acid a gradual decline was found in the melting point as shown in Table I, indicating that decomposition does take place at the melting point, although at the present time the decomposition products have not been conclusively determined. (A later paper may throw more light upon this subject.)

The fact that so many investigators have obtained such varied melting points of acetylsalicylic acid and have not in general stated methods used in obtaining this melting point, would indicate that it is essential to describe the method used in reporting results. This is shown very clearly in the work of Leech in obtaining a difference of from 2 to 2.5 degrees depending upon the temperature of the bath in preheating before immersion of the melting point tube. In determining the melting point of the six commercial samples of acetylsalicylic acid, the U. S. P. X

(abstract) method was followed using the correction of the general directions for melting points. The method gave consistent results in a number of determinations. As can be seen from Tables I and II all samples conform to the standards set by the U. S. P. X (abstract) and "New and Nonofficial Remedies" with the exception of sample 2.

In recrystallizing the acid from chloroform, benzene, carbon tetrachloride, acetone, and alcohol, respectively, it was found that the melting point of the crystals from the various solvents did vary which seems to show that the apparent melting point is not a true melting point. The crystals obtained from chloroform, benzene, and carbon tetrachloride, were small, white, well-defined needle-like crystals, while those from acetone and alcohol formed large, beautiful tabular crystals, many of which were 10 mm. in length. However, the study of their optical properties showed that the crystals from all five solvents were identical in every respect, any difference in appearance of the powders being due to the variation in crystal size which depended upon the rate of crystallization from the solvent.

SUMMARY.

1. Acetylsalicylic acid varies in melting point when crystallized from various solvents.

2. The crystals obtained from various solvents are identical in optical properties and crystal form.

3. Commercial acetylsalicylic acid has a melting point of about 133–134° C. corrected, determined as per U. S. P. X (abstract) method.

4. In reporting melting points of acetylsalicylic acid it is necessary to give methods used.

5. The temperature at which acetylsalicylic acid melts is apparently not a true melting point.

DRUG ASSAY LABORATORY, COLLEGE OF PHARMACY,
UNIVERSITY OF MICHIGAN.

SOME CRITICAL POINTS OF EMULSIFICATION IN OIL-SOAP EMULSIONS.*[1]

BY E. V. KYSER AND F. C. VILBRANDT.

The following is a continuation of previous work[2] on the emulsification of fixed oils in which the soap as the emulsifying agent is formed simultaneously with the emulsion.

For the determination of the critical points of emulsification in this series we have selected neutral cottonseed (Wesson) oil, to which we have added various percentages of sodium and potassium hydroxides, sodium and potassium carbonates and sodium silicate required to neutralize or saponify the oleic acid added.

---

* Scientific Section, A. PH. A., Buffalo meeting, 1924.

[1] School of Pharmacy and Department of Chemistry, University of North Carolina.

[2] Preliminary report on the Effect of Fatty Acids on Liniments and Emulsions, JOUR. A. PH. A., May, 1924, p. 433.

Where completed emulsification did not take place after the addition of unusually large amounts of oleic acid and hydroxides or silicate, it was decided that it was of no practical advantage to continue in this direction, because the resulting emulsion would become colored from the excess of acid and also because the amount of soap required to emulsify would be too large for palatable preparations.

In order to determine the value of the various soaps and practical application of the process for making the emulsions of various percentages of oil, soap, and water we made emulsions that contained ten, twenty, thirty, forty, and fifty per cent of oil respectively.

PROCEDURE.

Two-hundred-gram samples of each of the emulsions were made by the following method: the oil and oleic acid was weighed into a 300-cc. tall form beaker. The carbonates, alkalies, and silicates, previously calculated to neutralize the oleic acid, were added to the required amount of water and mixed. The oil and oleic acid were mixed and set in motion by means of a mechanical agitator, which consisted of a Cenco motor and a glass spiral stirring rod extending to the bottom of the beaker. A constant stream of water and saponifier was run slowly into the oil and acid. Agitation was continued for ten minutes after the addition of all of the ingredients. Emulsification was effected without the aid of external heat. For determining the viscosities of the oil and emulsions there was used a modified Sprengel viscometer consisting of a 100-cc. jacketed pipette calculated to permit water at 20° C. to pass from mark to mark in 14.1 seconds.

The tables of viscosities and separation show the percentage of oil, soap, saponifier, and water, also the kind of soap formed, the viscosity of the emulsion, the separation of the emulsion in terms of time started after emulsification, and when the separation was completed, the percentage of emulsified layer after 48 hours. Also the order in series of classification in the watery layer after complete separation of the emulsion. The percentage of water was calculated from the amount of water added and did not include water liberated by the action of the alkalies on the oleic acid.

TABLE OF VISCOSITIES AND SEPARATION.

Sample.	% Wesson oil.	% Oleic acid.	Saponifying agent.	Soap present.	% soap.	Viscosity in seconds.	Separation. Started.	Separation. Completed.	Emulsified layer after 48 hrs.	Order in series of clarification watery layer.
A-1	10	0.1	NaOH	Sod. oleate	0.11	16.5	10 min.	30 min.	10	3
2	10	0.2	NaOH	Sod. oleate	0.22	16.5	10 min.	30 min.	10	3
3	10	0.3	NaOH	Sod. oleate	0.33	16.5	10 min.	30 min.	10	3
4	10	0.4	NaOH	Sod. oleate	0.45	16.5	10 min.	30 min.	10	3
5	10	0.5	NaOH	Sod. oleate	0.56	16.4	10 min.	30 min.	10	3
6	10	0.75	NaOH	Sod. oleate	0.82	16.4	10 min.	30 min.	10	3
7	10	1.0	NaOH	Sod. oleate	1.11	16.4	12 min.	60 min.	10	3
8	10	1.5	NaOH	Sod. oleate	1.66	16.4	12 min.	60 min.	10	3
9	10	2.0	NaOH	Sod. oleate	2.23	16.4	30 min.	60 min.	10	3
10	10	3.0	NaOH	Sod. oleate	3.33	16.5	30 min.	60 min.	10	4
11	10	4.0	NaOH	Sod. oleate	4.46	16.6	30 min.	60 min.	10	5
12	10	6.0	NaOH	Sod. oleate	6.69	16.7	30 min.	60 min.	10	6
13	10	14.0	NaOH	Sod. oleate	15.96	18.5	30 min.	60 min.	10	7
B-1	10	2.0	KOH	Pot. oleate	2.40	16.3	10 min.	30 min.	10	7

Sample.	% Wesson oil.	% Oleic acid.	Saponifying agent.	Soap present.	% soap.	Viscosity in seconds.	Separation. Started.	Separation. Completed.	Emulsified layer after 48 hrs.	Order in series of clarification, watery layer.
2	10	3.0	KOH	Pot. oleate	3.60	16.2	10 min.	30 min.	10	8
3	10	4.0	KOH	Pot. oleate	4.80	16.3	10 min.	30 min.	10	8
4	10	6.0	KOH	Pot. oleate	7.19	16.7	15 min.	60 min.	10	8
5	10	14.0	KOH	Pot. oleate	16.79	19.4	60 min.	120 min.	10	10
C-1	10	2.0	Na_2SiO_3	Sod. oleate	2.23	16.4	10 min.	30 min.	10	2
2	10	3.0	Na_2SiO_3	Sod. oleate	3.33	16.4	10 min.	30 min.	10	3
3	10	4.0	Na_2SiO_3	Sod. oleate	4.46	16.5	10 min.	30 min.	10	4
4	10	6.0	Na_2SiO_3	Sod. oleate	6.85	16.6	10 min.	30 min.	10	5
5	10	14.0	Na_2SiO_3	Sod. oleate	15.96	316.4	72 hrs.	72 hrs.	80	15
D-1	10	2.0	Na_2CO_3	Sod. oleate	2.23	16.4	1 hr.	24 hrs.	20	1
2	10	3.0	Na_2CO_3	Sod. oleate	3.33	16.8	3 hrs.	24 hrs.	20	1
3	10	4.0	Na_2CO_3	Sod. oleate	4.46	17.2	24 hrs.	48 hrs.	20	1
4	10	5.0	Na_2CO_3	Sod. oleate	5.57	18.6	permanent		100	0
5	10	7.0	Na_2CO_3	Sod. oleate	7.79	22.7	permanent		100	0
E-1	10	2.0	K_2CO_3	Pot. oleate	2.40	16.3	1 hr.	24 hrs.	20	1
2	10	3.0	K_2CO_3	Pot. oleate	3.60	16.5	3 hrs.	24 hrs.	20	1
3	10	4.0	K_2CO_3	Pot. oleate	4.80	17.1	24 hrs.	48 hrs.	20	1
4	10	5.0	K_2CO_3	Pot. oleate	6.00	17.7	permanent		100	0
5	10	7.0	K_2CO_3	Pot. oleate	8.40	21.2	permanent		100	0
F-1	20	2.0	NaOH	Sod. oleate	2.23	16.3	15 min.	1 hr.	25	2
2	20	4.0	NaOH	Sod. oleate	4.46	16.5	15 min.	1 hr.	25	3
3	20	6.0	NaOH	Sod. oleate	6.69	16.8	15 min.	1 hr.	25	4
4	20	10.0	NaOH	Sod. oleate	11.14	18.4	15 min.	3 hrs.	25	5
5	20	12.0	NaOH	Sod. oleate	13.37	20.1	30 min.	8 hrs.	25	8
6	20	14.0	NaOH	Sod. oleate	15.96	21.3	1 hr.	8 hrs.	25	12
7	20	16.0	NaOH	Sod. oleate	18.19	25.5	1 hr.	8 hrs.	25	13
G-1	20	2.0	KOH	Pot. oleate	2.40	16.1	15 min.	1 hr.	25	3
2	20	16.0	KOH	Pot. oleate	19.19	25.7	1 hr.	6 hrs.	25	10
H-1	20	7.0	Na_2SiO_3	Sod. oleate	7.79	17.6	30 min.	8 hrs.(?)	33	6
2	20	12.0	Na_2SiO_3	Sod. oleate	13.37	111.1	24 hrs.	72 hrs.(?)	90	14
3	20	14.0	Na_2SiO_3	Sod. oleate	15.96	135.0	48 hrs.	72 hrs.(?)	95	14
I-1	20	1.0	Na_2CO_3	Sod. oleate	1.11	16.0	8 hrs.	48 hrs.	20	1
2	20	2.0	Na_2CO_3	Sod. oleate	2.23	16.0	8 hrs.	48 hrs.	20	1
3	20	3.0	Na_2CO_3	Sod. oleate	3.33	16.5	8 hrs.	48 hrs.	20	1
4	20	4.0	Na_2CO_3	Sod. oleate	4.46	16.6	8 hrs.	48 hrs.	25	1
5	20	5.0	Na_2CO_3	Sod. oleate	5.57	18.5	permanent		100	0
J-1	20	1.0	K_2CO_3	Pot. oleate	1.20	16.3	2 hrs.	48 hrs.	20	1
2	20	2.0	K_2CO_3	Pot. oleate	2.40	16.3	8 hrs.	48 hrs.	20	1
3	20	3.0	K_2CO_3	Pot. oleate	3.60	16.7	8 hrs.	48 hrs.	20	1
4	20	4.0	K_2CO_3	Pot. oleate	4.80	17.0	8 hrs.	48 hrs.	25	1
5	20	5.0	K_2CO_3	Pot. oleate	6.00	18.4	permanent		100	0
K-1	30	5.0	NaOH	Sod. oleate	5.57	17.5	1 hr.	8 hrs.	50	5
2	30	7.0	NaOH	Sod. oleate	7.79	18.6	1 hr.	8 hrs.	50	6
33	30	10.0	NaOH	Sod. oleate	11.14	22.3	6 hrs.	8 hrs.	60	7
4	30	12.0	NaOH	Sod. oleate	13.37	23.6	6 hrs.	8 hrs.	60	11
L-1	30	5.0	KOH	Pot. oleate	6.00	18.9	1 hr.	2 hrs.	50	6
2	30	7.0	KOH	Pot. oleate	8.40	21.7	2 hrs.	8 hrs.	50	7
3	30	10.0	KOH	Pot. oleate	12.00	23.8	2 hrs.	8 hrs.	75	8
4	30	12.0	KOH	Pot. oleate	14.40	25.0	8 hrs.	24 hrs.	90	9
M-1	30	5.0	Na_2SiO_3	Sod. oleate	5.57	17.6	1 hr.	8 hrs.	50	6
2	30	7.0	Na_2SiO_3	Sod. oleate	7.79	18.4	1 hr.	8 hrs.	50	6
3	30	10.0	Na_2SiO_3	Sod. oleate	11.14	128.0	permanent		100	0
N-1	30	3.0	Na_2CO_3	Sod. oleate	3.33	16.9	2 hr.	8 hrs.	50	1

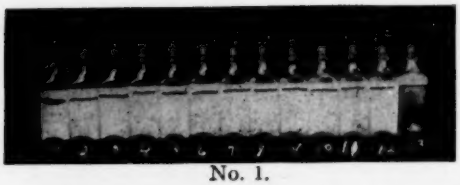
Sample.	% Wesson oil.	% Oleic acid.	Saponifying agent.	Soap present.	% soap.	Viscosity in seconds.	Separation. Started.	Separation. Completed.	Emulsified layer after 48 hrs.	Order in series of clarification, watery layer
2	30	4.0	Na_2CO_3	Sod. oleate	4.46	17.7	6 hrs.	8 hrs.	50	1
O-1	30	3.0	K_2CO_3	Pot. oleate	3.60	17.0	6 hrs.	8 hrs.	50	1
2	30	4.0	K_2CO_3	Pot. oleate	4.80	17.5	6 hrs.	8 hrs.	50	1
P-1	40	2.0	NaOH	Sod. oleate	2.23	17.9	1 hr.	24 hrs.	66	5
Q-1	40	2.0	KOH	Pot. oleate	2.40	17.9	1 hr.	24 hrs.	66	5
2	40	6.0	KOH	Pot. oleate	7.20	21.4	8 hrs.	36 hrs.	75	5
R-1	40	5.0	Na_2SiO_3	Sod. oleate	5.57	19.4	8 hrs.	36 hrs.	75	4
S-1	40	2.0	Na_2CO_3	Sod. oleate	2.23	18.0	8 hrs.	24 hrs.	70	1
T-1	40	2.0	K_2CO_3	Pot. oleate	2.40	18.4	8 hrs.	24 hrs.	70	1
U-1	50	2.0	NaOH	Sod. oleate	2.23	19.8	1 hr.	36 hrs.	50	7
V-1	50	2.0	KOH	Pot. oleate	2.40	19.7	1 hr.	24 hrs.	80	5
2	50	4.0	KOH	Pot. oleate	4.80	22.5	1 hr.	72 hrs.	80	5
W-1	50	3.0	Na_2SiO_3	Sod. oleate	3.33	21.5	16 hrs.	72 hrs.	99	5
X-1	50	2.0	Na_2CO_3	Sod. oleate	2.23	19.8	8 hrs.	24 hrs.	90	1
Y-1	50	2.0	K_2CO_3	Pot. oleate	2.40	19.7	8 hrs.	24 hrs.	90	1

SUMMARY OF RESULTS.

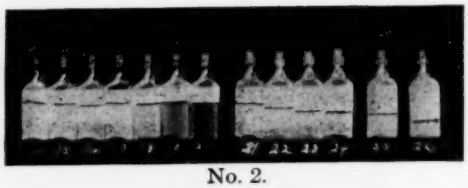
1. The use of sodium and potassium carbonates for the saponification of the oleic acid produces permanent emulsions when added in relatively small amounts. Where separation takes place the more aqueous layer retains the emulsion to such an extent that it is difficult to determine the line of demarcation; where separation does not take place the soaps formed by these saponifications are superior as emulsifying agents to those formed by the hydroxide or silicate saponification. The addition of 5 per cent oleic acid and the required amount of either of the two carbonates will produce permanent emulsions of ten per cent and twenty per cent of oil and likewise a corresponding diminution in the amount of oleic acid and carbonates will produce permanent emulsions of 30, 40, and 50 per cent of oil. Sodium and potassium carbonates have an equal value as saponifying agents, and the emulsions produced from each are indentical in physical properties. The emulsions produced by the addition of the carbonates are very fluid and therefore desirable for internal administration.

2. Sodium and potassium hydroxides for the saponification of the oleic acid are not desirable, because the quantity of oleic acid required to completely emulsify the oil causes coloration of the emulsions and the amount of soap formed is too great for a palatable preparation. The saponification of oleic acid by the hydroxides—14 per cent in the 10 per cent emulsions, 16 per cent in the 20 per cent emulsions, 12 per cent in the 30 per cent emulsions, 6 per cent in the 40 per cent emulsions and 4 per cent in the 50 per cent emulsions, does not produce permanent emulsification. The value of the two hydroxides as saponifying agents are the same, and the emulsions from each present the same physical properties. The watery layer does not retain the emulsified oil to the same degree as the carbonate saponifications.

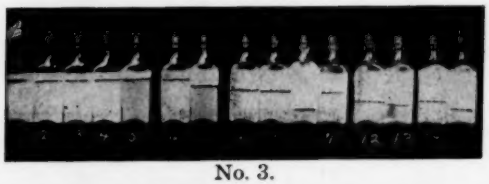
3. The saponification of oleic acid with sodium silicate, 14 per cent in the 10 per cent emulsions, 14 per cent in the 20 per cent emulsions, 5 per cent in the 40 per cent emulsions and 3 per cent in the 50 per cent emulsions, does not give complete emulsification. The use of sodium silicate in sufficient amounts to



No. 1.



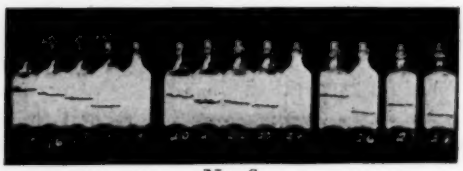
No. 2.



No. 3.

No. 4.

No. 5.



No. 6.

ILLUSTRATION SHOWING SEPARATION

No. 1. NaOH SAPONIFICATION

(1) 10% oil, 0.11% soap, (2) 10% oil, 0.22% soap, (3) 10% oil, 0.33% soap
(4) 10% oil, 0.45% soap, (5) 10% oil, 0.56% soap, (6) 10% oil, 0.82% soap
(7) 10% oil, 1.11% soap, (8) 10% oil, 1.66% soap, (9) 10% oil, 2.23% soap
(10) 10% oil, 3.33% soap, (11) 10% oil, 4.46% soap, (12) 10% oil, 6.69% soap
(13) 10% oil, 15.96% soap

No. 2. NaOH SAPONIFICATION

(14) 20% oil, 2.23% soap (15) 20% oil, 4.46% soap (16) 20% oil, 6.69% soap
(17) 20% oil, 11.14% soap (18) 20% oil, 13.37% soap (19) 20% oil, 15.96% soap
(20) 20% oil, 18.19% soap (21) 30% oil, 5.57% soap (22) 30% oil, 7.79% soap
(23) 30% oil, 11.14% soap (24) 30% oil, 13.37% soap (25) 40% oil, 2.23% soap
(26) 50% oil, 2.23% soap

No. 3. KOH SAPONIFICATION

(1) 10% oil, 2.40% soap (2) 10% oil, 3.60% soap (3) 10% oil, 4.80% soap
(4) 10% oil, 7.19% soap (5) 10% oil, 16.79% soap (6) 20% oil, 2.40% soap
(7) 20% oil, 19.19% soap (8) 30% oil, 6.00% soap (9) 30% oil, 8.40% soap
(10) 30% oil, 12.00% soap (11) 30% oil, 14.40% soap (12) 40% oil, 2.40% soap
(13) 40% oil, 7.20% soap (14) 50% oil, 2.40% soap (15) 50% oil, 4.80% soap

No. 4. Na_2SiO_3 SAPONIFICATION

(1) 10% oil, 2.23% soap (2) 10% oil, 3.33% soap (3) 10% oil, 4.46% soap
(4) 10% oil, 6.85% soap (5) 10% oil, 15.96% soap (6) 20% oil, 7.79% soap
(7) 20% oil, 13.37% soap (8) 20% oil, 15.96% soap (9) 30% oil, 5.57% soap
(10) 30% oil, 7.79% soap (11) 30% oil, 11.14% soap (12) 40% oil, 5.57% soap
(13) 50% oil, 3.33% soap

No. 5. K_2CO_3 SAPONIFICATION

(1) 10% oil, 2.40% soap (2) 10% oil, 3.60% soap (3) 10% oil, 4.80% soap
(4) 10% oil, 6.00% soap (5) 10% oil, 8.40% soap (6) 20% oil, 1.20% soap
(7) 20% oil, 2.40% soap (8) 20% oil, 3.60% soap (9) 20% oil, 4.80% soap
(10) 20% oil, 6.00% soap (11) 30% oil, 3.60% soap (12) 30% oil, 4.80% soap
(13) 40% oil, 2.40% soap (14) 50% oil, 2.40% soap

No. 6. Na_2CO_3 SAPONIFICATION

(15) 10% oil, 2.23% soap (16) 10% oil, 3.33% soap (17) 10% oil, 4.46% soap
(18) 10% oil, 5.57% soap (19) 10% oil, 7.79% soap (20) 20% oil 1.11% soap
(21) 20% oil, 2.23% soap (22) 20% oil, 3.33% soap (23) 30% oil, 4.46% soap
(24) 20% oil, 5.57% soap (25) 30% oil, 3.33% soap (26) 30% oil, 4.46% soap
(27) 40% oil, 2.23% soap (28) 50% oil, 2.23% soap

completely emulsify the oil has a tendency to cause granulation—that is, the emulsion does not separate into two layers but shows signs of partial gelatinization and separation of a granular nature. This is evidenced by the use of 10 per cent oleic acid and sodium silicate in the 20 per cent emulsions. The relative position of sodium silicate as the saponifying medium lies between the carbonates and hydroxides.

4. The oil used gave a viscosity of 51.5 seconds, and with the exception of the sodium silicate emulsions all of the emulsions range in viscosity between that of water and that of oil. All of the emulsions contained sufficient soap to emulsify the oil completely. This was shown by the suds on top of the emulsions after agitation. This soapiness reduces the external adhesion of the mass for the outlet, so that any increase in the viscosity of the emulsions over that of water can be attributed to the percentage of solids present and the internal cohesion of the emulsified particles. Therefore, the oil lends itself to increasing internal cohesion. It is readily seen that the difference in viscosity cannot be due to any great extent to the oil, because in series U to Y, in which 50 per cent of oil is used, the viscosities have increased 8.4 seconds only above that of water, or, in other words, the emulsification of the oil has reduced the viscosity from 51.5 to 22.5 seconds. In the case of the sodium silicate emulsions, which show signs of gelatinization or granulation, the internal cohesion is increased enormously when the percentage of soap is increased and the high external adhesiveness of the silicate is also evident. In general, the increase in oil content increases the viscosity when the percentage of soaps are increased above 4 per cent. This does not apply to the silicate emulsions, which were thrown out because of other influences.

5. A study of the rates of separation in connection with the viscosities shows that the soaps formed by the hydroxide saponifications are much inferior to the soaps formed by the silicate or carbonates as emulsifying agents. Although increased oil content increases the time limit before the separation of the emulsion starts, an increase in the amount of soap formed also increases the time before the emulsion completely separates. The difference in the time of separation decreases as the soap is increased in the same series, and it also decreases as the oil content is increased.

6. The per cent of emulsified layer after 48 hours as given in column 10 is a relative measure of the extent of separation after a given length of time when no further progressive separation is evident. The increasing percentage of emulsification as the series is extended by increasing the oil content is not a true measure of permanency, since a 10 per cent emulsion in the 10 per cent series is the best that can occur if all of the oil should separate; whereas in the 50 per cent series the least that can occur is a 50 per cent separation. However, this table of information is important in showing the relative permanency of the emulsification of the oils in each series. Even in the 10 per cent series A, B, C, D, and E, the permanency rises from 10 per cent in the hydroxide series A and B to 20 per cent for the lowest of the carbonate series. This shows that the formation of an excess of 5 per cent soap by the use of carbonates as the saponifying agent is doubly effective over the formation of so large a quantity of soap as 16.8 per cent by the use of the hydroxides. In the 20 per cent oil series F, G, H, I, J, and K eliminating the adhesive silicate results, we again obtain the same general result. Increase of oil where the per cent

of soap remains constant or increase of soap where the oil remains constant tends to increase the permanency of the emulsion. Of course in this connection it should be borne in mind that the increase in oil and soap likewise decreases the per cent of water.

7. After the complete separation of the emulsions the aqueous bottom layers that prevail show some interesting variations. The degree of separation varies with the oil content, the percentage of soap, the percentage of water, and the saponifying agent used. The classification given in column 11, order in series of classification in watery layer, presents a relative degree of separation of the emulsified oil layer from the aqueous portion. It varies from a rating of 1, in which it is difficult to discern the line of demarcation, to 16, in which the watery layer is perfectly clear and transparent. That is, no emulsified oil is suspended in the aqueous portion. It will be noted that the emulsions in which carbonates were used are rated as 1 or 0, the latter indicating no separation. Then as the soap content is increased in each series, as in A, B, or C, there is an increase in the separation of the emulsified layer from the aqueous layer, that is, the emulsified oil rises to the top and leaves less emulsified particles in the aqueous bottom portion.

8. Relatively small amounts of soaps formed from the action of the carbonates on oleic acid are decided superior as emulsifying agents to the soaps formed by the action of the corresponding hydroxides and sodium silicate. This presents an interesting subject for further investigation. The fact that the same percentage of soap formed with each of these saponifiers does not have the same value as emulsifiers may be attributed to one or many influences. It is apparent that the question of the ability of the soap to hydrate properly is one of the contributing factors in the stability of the emulsions. This is borne out by the fact that an increase in oil and a decrease in water requires less soap regardless of the saponifier used. The rapidity of the rate of saponification in the case of the hydroxides and the silicates when compared with that of the carbonates probably explains the difference in the extent of hydration. Where saponification is rapid there is a tendency on the part of the saponified or partially saponified mass to bunch, and where such bunching occurs hydration takes place slowly and it is more than likely that a percentage of the soap instead of hydrating and becoming colloidal, goes into solution in the water. Soaps vary in their physical properties depending upon the nature of the alkalies used in saponification, the temperature, and the conditions under which saponification takes place. Merklen[1] concludes that soap as an "absorption product" is capable of continual variation, and that the absorption of water by the colloidal soap depends upon (1) the structure and nature of the colloid; (2) the nature of the solvent; (3) the nature of the electrolytes present (salts and alkalies ; (4) upon the temperature. One of these conditions, the nature of the solvent, may be eliminated. However, the other three, perhaps, have a direct bearing upon the inequality of these soaps as emulsifying agents.

Further experiments in this direction as well as in the direction of determining the value of soap as emulsifying agents will be considered at another time in connection with other fixed oils.

---

[1] *Etudes sur le constitution des savons du commerce dans sec rapports avec la fabrication,* Marseille, 1906.

OIL OF ACHILLEA MILLEFOLIUM, L. 1922.*

BY ROLAND E. KREMERS.[1]

The evaluation of the economic possibilities of a native volatile-oil-yielding medicinal plant is not rational until the variability of the oil has been investigated over a period of years and until its behavior under cultivation has been observed. For these reasons, and also because this particular oil is the best source of the blue hydrocarbon azulene, the Wisconsin Pharmaceutical Experiment Station has been growing an increasing area of *Achillea millefolium, L.*, commonly known as milfoil or yarrow. The data here recorded for an oil distilled during July, 1922, are the first afforded by the cultivated material. Inasmuch as previous researches[2,3] have established the composition of the oil fairly well, the principal attention was given to unsettled problems, *i. e.*, to the "thujone fraction" and to azulene.

The plants were harvested from a mixed stand; some were two years old, others were set out in the fall of 1921, and still others were transplanted in the spring of 1922. However, all plants were at the flowering stage. The cultivation and distillation were supervised by Prof. W. O. Richtmann of the Station. The yield of oil was 780 Gm. from the primary distillation and an additional 420 Gm. from the cohobation of the aqueous distillate. The latter represents an increase of 53.3 per cent. The total yield of oil was equal to 0.1715 per cent. of the herb distilled.

The oil possessed its characteristic azulene blue color and its usual odor. The following values were determined.

	Original oil.	Cohobated oil.
d_{25}	0.8980	0.9410
Ester No.	22.0	14.9
Ester No. after acetylation	70.9	115.7
Per cent. ester	7.8	5.3
Per cent. combined alcohol	6.1	4.2
Per cent. free alcohol	14.8	31.1
Per cent. total alcohol, $C_{10}H_{20}O$	20.9	35.3

Acids.—The free acids were removed from the oil by two extractions with 10 per cent sodium bicarbonate solution, 100 cc. and 50 cc., respectively. The separated aqueous layers were combined, filtered to remove suspended oil and acidified with an excess of 25 per cent sulphuric acid. The organic acids were then removed by steam distillation. They were recovered in the form of their Na-salts by evaporation of the neutralized distillate. The amount was too small for investigation.

Aldehydes.—Following the removal of the free acid, the oil was examined for aldehydes. Tiemann's sulphite-bicarbonate method for separating citral and citronellal (*Ber.*, 32, 822 (1899)) took out only a trace of oil. However, a 30 per cent sodium bisulphite solution yielded a small quantity of a crystalline product from which was regenerated an aldehyde having a lemon-like odor. A few milligrams of semicarbazone were obtained m. p. 72°; m. p. after recrystallization 72–75° C.

---

* Contribution from the Wisconsin Pharmaceutical Experiment Station.

[1] National Research Council Fellow in Chemistry.

[2] E. R. Miller, "The Chemistry of the Oil of Milfoil," *Bull.*, 785, U. of Wis.

[3] Kremers, R. E., "The Chemistry of the Volatile Oil of Milfoil," JOUR. A. PH. A., 10, 252 (1921).

The trace of aldehyde regenerated from the bisulphite mother liquor possessed a furfural-like odor. This yielded a semicarbazone that could not be purified.

FRACTIONATION.

In order to remove any possible destructive action of dissolved inorganic substances on azulene during the subsequent fractionation, the oils were steam distilled. The higher boiling, dark blue fractions came over slowly, but completely, leaving only a green, tarry residue. The steam-distilled fractions were dried over Na_2SO_4 and were fractionated four times. The lower boiling substances yielded the following series:

B. p., ° C.	Vol., cc.	d_{25}.
–160	38	0.856
160– 65	130	0.859
165– 70	59	0.863
170– 75	45	0.868
175– 80	33	0.876
180– 85	27	0.891
185– 90	31	0.907
190– 95	37	0.917
195– 00	75	0.933
200– 05	62	0.935
205– 10	60 separated borneol	0.951
210 plus°	residue	

The cohobated oil fractionated as follows:

° C.	Cc.
–185	40
185– 95	45
195– 00	65
200° plus	residue

The residual fractions, which were colored dark blue, were united and worked up for azulene. The other fractions were appropriately combined.

Examination of Ketone Fraction.—Since thujone has been previously identified in milfoil oil, its removal was attempted as follows. After as much borneol as possible had been frozen out of fractions 200–210°, fractions 190–210° were combined, in all 220 cc. To these were added 60 cc. of alcohol and 300 cc. of 33 p. c. bisulphite solution. The mixture was shaken frequently. At the end of two weeks, however, no addition compound had separated. Hence the oil was recovered by steam distillation. No ketone was regenerated from the aqueous bisulphite residue by neutralizing with Na_2CO_3.

The rectified oil was assayed for alcohols. After acetylation in the usual manner, saponification revealed an ester number of 72.8, corresponding to 21.2 per cent bornyl acetate. The total oil was then acetylated: 200 cc. of oil, 50 cc. acetic anhydride and 20 Gm. sodium acetate were heated together on a water-bath for 4 hours. The excess of anhydride was then decomposed by water, and the oil was washed free of acid by saturated NaCl solution. The oil was fractionated *in vacuo* four times resulting in the following series:

B. p. 28 °C.	Vol., cc.	d_{28}	n.	$\frac{\alpha}{\text{degrees.}}$
−100	57	0.921	1.4585	−14
100− 05	44	0.937	1.4595	−20.6
105− 10	11	...	1.4620	−22.6
110− 20	33	0.956	1.4640	...
120°	10	residue		

Fractions boiling —105° were oxidized by permanganate, ref. Wallach, *Ann.*, 353, 211 (1907), to see whether any Fenchone was present.

Oil	=	100 cc.
$KMnO_4$	=	230 Gm.
H_2O	=	3750 cc. at 40°

The mixture was thoroughly shaken for 40 minutes, during which time a pronouncedly exothermic reaction took place. After standing over night, the oxides had settled, leaving a colorless aqueous solution. Needle-like crystals, presumably borneol, had sublimed on to the walls of the flask. The soluble salts were removed by filtration and their solution was concentrated on a water-bath to a small volume. The free acids were precipitated by dilute mineral acid and crystallized after standing some days. M. p. 78–9° C. Semicarbazone m. p. 191–2° C. These constants agree with those recorded for B—thuja ketocarbonic acid.

The acetylated fractions were saponified by refluxing them in alcohol solution with KOH for three hours. The alcohol was then largely removed by distillation and the oil precipitated by water. The product crystallized on cooling and consisted essentially of borneol.

The isolation of azulene was accomplished by the previously published technique (*J. Am. Chem. Soc.*, 45, 717 (1923)). It should, however, be reported that a repetition of the permanganate oxidation confirmed previous results. A small yield of non-volatile acid giving a phthalein reaction was again obtained. In addition, acetic acid was positively identified among the volatile acids by its conversion into acetanilide, m. p. 113–14° C.

SUMMARY.

(1) The foregoing investigation revealed that the cultivated milfoil oil obtained in 1922 had a higher density and a greater percentage of borneol than the native 1916 and 1919 oils (3) but compared very well with those obtained by Miller in 1924 (2).

(2) The constituents of the oil appeared to be identical with those of the oils previously examined by the writer. Thujone was again the only ketone identified but the failure to isolate it through the bisulphite addition product is puzzling. Fenchone was not found.

(3) The previously observed behavior of azulene toward permanganate oxidation was confirmed, and acetic acid was definitely characterized as a product.

BIBLIOGRAPHY OF PHARMACEUTICAL RESEARCH

Compiled by A. G. DuMez, Reporter on the Progress of Pharmacy.

All articles recorded in these lists will be presented in abstract form in the bound volumes of the YEAR BOOK, which is issued annually. Those desiring abstracts immediately can obtain them for a fee of one dollar each by communicating with A. G. DuMez, Hygienic Laboratory, U. S. P. H. S., 25th & E Sts., N. W., Washington, D. C.

APPARATUS AND MANIPULATION.

Blok, C. J.
Method for the determination of the p_H "spectrum" of bacteria
Pharm. Weekbl., 62 (1925), 346

Eaton, E. O.
An automatic "nonbreaking" syphon
JOUR. A. PH. A., 14 (1925), 329

DeGraaff, W. C.
Sterilization in the Netherlands Pharmacopœia V.
Pharm. Weekbl., 62 (1925), 249

PHARMACOPŒIAS AND FORMULARIES.

Anon.
Italian Pharmacopœia Commission
Chem. & Drug., 102 (1925), 408

PHARMACEUTICAL PREPARATIONS.

Anon.
Glycerinum Amyli, B. P.
Chem. & Drug., 102 (1925), 496

Belcot, E.
Preparation of mercury ointment using perhydrol
Rev. Farm. (Dec., 1924); through *Chem. & Drug.*, 102 (1925), 449

Dubin, Harry E.
Palatable cod liver oil concentrate possessing the therapeutic properties of cod liver oil
JOUR. A. PH. A., 14 (1925), 215

Gastard, J.
Preparation of syrups from fluidextracts
Thèse Doct., Nancy (1925), 122 pp.; through *Bull. Sci. pharmacol.*, 32 (1925), 187

Grüning, W.
Preparation of iron-heparin
Pharm. Zentralh., No. 31 (1924); through *Pract. Drug.*, 43 (1925), 34

Kilmer, Fred B., and Hunt, F. L.
Standards and tests for Belladonna Plaster
JOUR. A. PH. A., 14 (1925), 241

Kroeber, L.
Fluidextract of uva ursi
Pharm. Ztg., 70 (1925), 89

Ulbrich, A.
Gelatin base for suppositories
Pharm. Ztg. (Oct. 22, 1924); through *Pract. Drug.*, 43 (April, 1925), 34

Windrath
Syrup of balsam of Peru
Pharm. Ztg., 70 (1925), 101

PHARMACOLOGY AND THERAPEUTICS.

Atkinson, H. V.
Toxicity of impurities in wood alcohol
J. Pharm. & Exp. Therap., 25 (1925), 144

Bijlsma, U. G.
Pharmacological action of Viscum album
J. pharm. Belg., 7 (1925), 188

Cheadle, F. M.
Preparation and standardization of insulin
Aust. J. Exp. Biol., 1 (1924), 121 and 129; through *Chem. & Ind.*, 44 (1925), B24

Copeland, A. J.
Pharmacology of psicaine
Brit. Med. J., (Jan. 3, 1925); through *Chem. & Drug.*, 102 (1925), 463

Desgrez, A., Bierry, H., and Rathery, F.
Titration method for insulin
Bull. Acad. méd. (March 25, 1924); through *Bull. Sci. pharmacol.*, 32 (1925), 123

Douris, R., and Beytout, G.
Comparison of the toxicology of the antisyphilitic mercurials
Bull. Sci. pharmacol., 32 (1925), 7

Gilman, H., and Pickens, R. M.
Correlation of aromatic types with anesthetic action
J. Am. Chem. Soc., 47 (1925), 245; through *Chem. & Drug.*, 102 (1925), 462

Guillot, Pierre
Study of the toxicology and antiseptic power of tetrachlorophenol
Thèse Doct. Univ. (Lyons, 1924), 60 pp.; through *Bull. Sci. pharmacol.*, 32 (1925), 103

Gruber, Charles M.
Effect of "benzycin" and "benzyphos" on the cardio-vascular systems
J. Pharm. & Exp. Therap., 25 (1925), 157

Hale, Worth, and Ganz, Robert
Alkalies in methyl alcohol poisoning
J. Pharm. & Exp. Therap., 25 (1925), 144

Hirschfelder, A. D., Malmgren, George, and Creavy, Donald
Penetration of mercurochrome, acriflavin and gentian violet into edematous tissues
J. Pharmacol. & Exp. Therap., 24 (1925), 459

Hunt, Reid
Standardization of thyroid
J. Pharmacol. & Exp. Therap., 25 (1925), 138

Handovsky, H., Bois-Raymond, E., and von Strauz, C. M.
Effects of chemicals on vitality
Arch. exp. Path. u. Pharm., 100 (1924), 273; through *Chem. & Drug.*, 102 (1925), 462

Heyl, Frederick W., Hart, Merrill C., and Payne, Wilbur B.
A note on the chemical composition and biological activity of Liquor Folliculi
Jour. A. Ph. A., 14 (1925), 210

Hogben, L. T., Schlapp, Walter, and Macdonald, A. D.
Quantitative comparison of the pressor activity of pituitary extracts
Quart. J. Exptl. Physiol., 14 (1924), 301; through *Chem. Abstr.*, 19 (1925), 1031

Ishiwara, F.
Fugutoxin
Chem. & Drug., 101 (1924), 925

Jackson, D. E.
Epinephrine in the treatment of angina pectoris
J. Pharmacol. & Exp. Therap., 25 (1925), 148

Jensen, Herman H., and Hirschfelder, Arthur D.
Studies on the local anesthetic and antispasmodic action of some ethers and esters of saligenin
J. Pharmacol. & Exp. Therap., 24 (1925), 423

Kirk, W. H.
Effect of chloretone on cats
Veterinary J., (1924), 288; through *Pract. Drug.*, 43 (April, 1925), 34

Kuhn, H. A., and Loevenhart, A. S.
Antagonism between sodium thiosulphate and arsenical compounds
J. Pharmacol. & Exp. Therap., 25 (1925), 160

Leonard, V.
Hexyl resorcinol
J. Am. Med. Assoc. (Dec. 20, 1924); through *Chem. & Drug.*, 102 (1925), 462

Lyon, D. M., Robson, W., and White, A. C.
Intarvin in diabetes
Brit. Med. J., 1 (1925), 208; through *Chem & Drug.*, 102 (1925), 460

Mendel, B., Wittgenstein, A., and Wolffenstein, E.
Perlingual administration of insulin
Klin. Wchnschr. (Dec. 16, 1924); through *Chem. & Drug.*, 102 (1925), 460

Mendenhall, Walter L., and Connolly, Ruth
Studies of the effects of impurities in ether used for anesthesia
J. Pharmacol. & Exp. Therap., 25 (1925), 145

Pindar, Arthur W.
Pharmacological action of gentian violet
J. Pharmacol. & Exp. Therap., 25 (1925), 163

Rowe, L. E.
Elimination of mercurials with particular reference to mercurosal
Jour. A. Ph. A., 14 (1925), 317

Scremin, L.
Action of iodides in chronic lead poisoning
Arch. exp. Path. u. Pharm., 99 (1923), 96; through *Bull. Sci. pharmacol.*, 32 (1925), 119

Snapper, I.
Sanocrysin in treatment of tuberculosis
Nederl. Tijds. Geneesk. (Dec. 6, 1924); through *Chem. & Drug.*, 102 (1925), 460

Straub, W.
Assay of thyroid gland preparations
Deutsch. med. Wchnschr., 51 (1925), 4; through *Chem. Abstr.*, 19 (1925), 1177

Takayanagi, T.
Cumulation of digitalis bodies in frogs
Arch. exp. Path. u. Pharm., 99 (1923), 17; through *Bull. Sci. pharmacol.*, 32 (1925), 120

Violle, H., and De Saint-Rat
Hemostatic action of pectin
L' Union Pharm. (Feb., 1925); through *Chem. & Drug.*, 102 (1925), 462

Voegtlin, Carl, Dunn, E. R., and Thompson, J. W.
Antagonistic action of glycerol in insulin intoxication
J. Pharmacol. & Exp. Therap., 25 (1925), 168

Young, Hugh H.
Results in sterilization with mercurochrome and gentian violet
J. Pharmacol. & Exp. Therap., 25 (1925), 172

GENERAL BOTANY AND BACTERIOLOGY.

Cooper, E. A., Woodhouse, D. L., and Forstner, G. E.
Conditions affecting bactericidal power
Chem. & Ind., 44 (1925), 135T.

Ramon, G.
Diphtheria anatoxin and anatoxins in general
Ann. Inst. Pasteur, 39 (1925), 1; through *Chem. & Ind.*, 44 (1925), B226

Schneider, Albert
Botany, pharmacology and therapy of Castela Nicholsoni
JOUR. A. PH. A., 14 (1925), 201

Youngken, Heber W.
Anatomy and botanical position of miré
JOUR. A. PH. A., 14 (1925), 195

VEGETABLE AND ANIMAL DRUGS.

Anon.
Synthetic Pepper
L' Union Pharm. (Feb., 1925); through *Chem. & Drug.*, 102 (1925), 454

Cahn, G.
Digestive activity of several commercial enzyme preparations
Arch. Verdauungs-Krankh., 34 (1924), 1; through *Chem. Abstr.*, 19 (1925), 1031

Charonnat, R.
Active principles of pyrethrum
Bull. Sci. pharmacol., 32 (1925), 86

Chen, K. K.
Pharmacognostic study of Ephedra vulgaris
JOUR. A. PH. A., 14 (1925), 189

Locke, Arthur, and Hirsch, E. F.
Fractionation of insulin proteins by electrodialysis
J. Am. Med. Assoc., 83 (1924), 1913

Maheu, Jacques
Derris elliptica, Benth. and Derris uliginosa, Benth
Bull. Sci. pharmacol., 32 (1925), 134

Maizit, J.
Latvian opium
Latvijas Farm. Zurmals (1924), 143; through *Chem. & Drug.*, 102 (1925), 459

Maurin
Experiments in the cultivation of stramonium
Bull. Sci. pharmacol., 32 (1925), 75

Melton, William E., and Sayre, L. E.
Proximate analysis of euphrasia
JOUR. A. PH. A., 14 (1925), 308

Müller, A.
Contribution to the knowledge of the senecios
Heil- u. Gewürzpfl., 7 (1924); through *J. pharm. Belg.*, 7 (1925), 224

Murayama and Shinozaki
Constituents of Kawa-Kawa. I. Kawaic acid
J. Pharm. Soc. Japan, No. 516 (1925), 185

Muszynski, J.
Genuine and false jequirty
Acta Societatus Bot. Poloniae, No. 3 (1924); through *Chem. & Drug.*, 102 (1925), 459

Sabalitschka, Th., and Jungermann, C.
Assay of nux vomica
Pharm. Zentralh. (March 5, 1925); through *Chem. & Drug.*, 102 (1925), 451

Tocco-Tocco-Luigi
Cause of the change in the behavior of old strophanthus seeds toward sulphuric acid
Arch. int. Pharmac. et Therap., 28 (1924), 289; through *Bull. Sci. pharmacol.*, 32 (1925), 115

Vrgoc, A.
Adulteration of conium
Farm. Vjestnik, No. 8 (1923); through *Chem. & Drug.*, 102 (1925), 459

Vrgoc, A.
Rhamnus carniolica
Farm. Vjestnik (Dec., 1924); through *Chem. & Drug.*, 102 (1925), 458

Xrayser II
Cantharides
Chem. & Drug., 102 (1925), 505

Youngken, Heber W.
Drugs of North American Indians. II.
Am. J. Pharm., 97 (1925), 158

ALKALOIDS AND GLUCOSIDES.

Babuglia, R. T.
Determination of morphine in opium
Anales asoc. quim. Argentina, 12 (1924), 124; through *Chem. Abstr.*, 19 (1925), 1176

Echave, D.
Adrenaline from the analytical point of view
Anales asoc. quim. Argentina, 12 (1924), 234; through *Chem. Abstr.*, 19 (1925), 1031

Ekkert, L.
Color reactions of physostigmine
Pharm. Zentralh., 66 (1925), 53; through *Chem. Abstr.*, 19 (1925), 1177

Ekkert, L.
Color reaction of pilocarpine
Pharm. Zentralh., 66 (1925), 36; through *Chem. Abstr.*, 19 (1925), 1177

Isnard, E.
Contribution to the study of emetine bismuthous iodide
Bull. Sci. pharmacol., 32 (1925), 78

Kanewskaja, S. J.
New method of separation of opium alkaloids
J. pharm. Belg., 7 (1925), 185

Krantz, John C., Jr.
Use of the potentiometer in the quantitative analysis of alkaloidal solutions
JOUR. A. PH. A., 14 (1925), 294

LaBarre, J.
Surface tension of the bitter principles
Arch. int. Pharmac. et Therap., 28 (1924), 421; through *Bull. Sci. pharmacol.*, 32 (1925), 114

Liot, A.
Variation in the p_H of solution of cocaine hydrochloride subjected to sterilization
Bull. Sci. pharmacol., 32 (1925), 83

Parri, W.
Color reaction of alkaloids
Giorn. farm., 73 (1924), 129; through *Bull. Sci. pharmacol.*, 32 (1925), 189

Ross, I. C.
Arecoline hydrobromide as an anthelmintic
J. Comp. Path. & Therap. (1924), 246; through *Chem. & Drug.*, 102 (1925), 464

Stedman, E., and Barger, G.
Constitution of physostigmine
J. Chem. Soc., Lond., 127 (1925), 246; through *Chem. & Drug.*, 102 (1925), 450

Wagener, Leonard R., and McGill, William J.
Application of the quinhydrone reaction to alkaloidal titrations
Jour. A. Ph. A., 14 (1925), 288

Watson-Williams, E.
Properties of psicaine
Brit. Med. J. (Jan. 3, 1925); through *Chem. & Drug.*, 102 (1925), 459

Willstätter, R.
Synthesis of psicaine
Münch. med. Wchnschr., 71 (1924), 849; through *Chem. Abstr.*, 19 (1925), 1176

OILS, FATS AND WAXES.

Giordano, R.
Preparation of olive oil for injection
Rev. Farm. Buenos Aires (1924), Nos. 10 and 11; through *Chem. & Drug.*, 102 (1925), 449

Lifschutz, I.
Instability of wool fat
Ztschr. physiol. Chem., 141 (1924), 146; through *Chem. & Ind.*, 44 (1925), B214

Rosenmund, K. W., and Kuhnhenn, W.
Bromine-iodine value of fats
Pharm. Zentralh., 66 (1925), 81; through *Chem. & Ind.*, 44 (1925), B214

von Fellenberg, T.
Detection of rancidity in fats
Mitt. Lebensmit., Hyg., 15 (1924), 198; through *Chem. & Drug.*, 44 (1925), B179

Wernicke, E.
Myrabola oil
Chem.-Ztg. (Jan. 29, 1925); through *Chem. & Drug.*, 102 (1925), 458

ESSENTIAL OILS.

Anon.
Oil of Xanthoxylum ovavolium
Indian Forest Records, 12 (1924); through *Chem. & Drug.*, 102 (1925), 457

Anon.
Oil of Juniperus communis
Indian Forest Records, 12 (1924); through *Chem. & Drug.*, 102 (1925), 457

Albricci, A.
Calabrian essential oils
Riv. ital. essen. e profum. (Feb. 15, 1925); through *Chem. & Drug.*, 102 (1925), 457

Berlingozzi, S., and Badolato, P.
Oil of Cosmos bipinnatus
Boll. Chim.-Farm. (Dec. 15, 1924); through *Chem. & Drug.*, 102 (1925), 458

Berlingozzi, S., and Badolato, P.
Oil of Salvia sclarea

Etablissements, A. Chiris
Oil of Eucalyptus citriodora Hook
Parfums de France, No. 23 (Jan., 1925), 18; through *Chem. Abstr.*, 19 (1925), 1178

Etablissements, A. Chiris
Chinese oil of cinnamon
Parfums de France No. 23 (Jan., 1925), 17; through *Chem. Abstr.*, 19 (1925), 1178

Francesconi, L., and Scarafia, P.
Essential oil of Santolina chamæcyparissus
Riv. ital. essen. e profum., 6 (1924), 76; through *Perf. & Ess. Oil. Rec.*, 16 (1925), 94

Gatti, Giovanni and Cajola, Renato
Action of essential oils on skin parasites
Riv. ital. essen. e profum., 7 (1924), 73; through *Bull. Sci. pharmacol.*, 32 (1925), 125

Glichitch, L. S.
Composition of the essential oil of Ocimum canum, Sims
Parfums de France, No. 21 (1924), 314; through *Chem. Abstr.*, 19 (1925), 1032

Longuet, A.
Constituents of the essential oil of Crithmum maritimum
Bull. Sci. pharmacol., 32 (1925), 66

Massera, V.
Oil of Santolina chamæcyparissus
Boll. Chim.-Farm. (Jan. 30, 1925); through *Chem. & Drug.*, 102 (1925), 457

Morani, Valentino
Essential oil of Ptychotis verticillata Duby
Ann. chim. appl., 14 (1924), 275; through *Chem. Abstr.*, 19 (1925), 1029

Moudgill, K. L.
Lantana camara leaf oil
Perf. & Ess. Oil Rec., 16 (1925), 9

Parry, E. J.
Spanish oil of rosemary
Parfum. Mod., 17 (1924), 232; through *Chem. Abstr.*, 19 (1925), 558

Randall, W. W.
Rotations produced by lemon oil and sweet orange oil in alcoholic solution
J. Assoc. Off. Agric. Chem., 8 (1924), 206

Romeo, G.
Oil from bergamot residues
Riv. ital. essen. profum., 6 (1924), 76; through *Perf. & Ess. Oil Rec.*, 16 (1925), 94

Simmons, W. H.
Sage oil
Perf. & Ess. Oil Rec., 16 (1925), 80

MISCELLANEOUS PLANT CONSTITUENTS.

Mindes, J.
Santonin test
Pharm. Monatsh. (Feb., 1925); through *Chem. & Drug.*, 102 (1925), 450

Sando, Charles E.
Plant coloring matters
Jour. A. Ph. A., 14 (1925), 299

Van den Bergh, R.
Glucokinin, a new plant hormone
Bull. Sci. pharmacol., 32 (1925), 145

GENERAL AND PHYSICAL CHEMISTRY.

Angelescu, B. N.
Volumetric determination of manganese
Bul. Soc. Chim. Romania, 6 (1924), 109; through *Chem. & Ind.*, 44 (1925), B192

Eastman, E. D.
Theory of certain electrometric and conductometric titrations
J. Am. Chem. Soc., 47 (1925), 332

Feigl, F.
Estimation of antimony by means of pyrogallol
Répert. pharm., 36 (1925), 20

Herboth, L.
Use of aminosulphonic acid as a standard in volumetric analysis
Arch. Pharm., 262 (1924), 517; through *Chem. & Ind.*, 44 (1925), B29

Kunft, J.
Identification of chlorine, bromine and iodine in mixtures of the three
Pharm. Ztg., 70 (1925), 120

Lange, N. A., and Ward, L. A.
Determination of small amounts of iodine as iodide and iodate
J. Am. Chem. Soc., 47 (1925), 1000

Mellon, M. G., and Morris, V. N.
Standardization of acids and bases with borax
Ind. Eng. Chem., 17 (1925), 145

Richard, Eugene
Determination of hydrogen-ion concentration by means of the colorimeter
J. pharm. et chim., 1 (1925), 328

Rothlin, H.
Potassium metabisulphite as a reagent for cinnamic aldehyde
Farm. Revy (Jan. 24, 1925); through *Chem. & Drug.*, 102 (1925), 452

Rupp, E.
Volumetric solution of sodium hydroxide
Pharm. Ztg., 70 (1925), 120

Schoorl, N.
Rational atomic weights for use in chemical analyses
Pharm. Weekbl., 62 (1925), 280

Schoorl, N.
Power of salts to adsorb water
Pharm. Weekbl., 62 (1925), 276

Soule, Byron A.
Alpha-furaldioxime as a reagent for the detection and determination of nickel
J. Am. Chem. Soc., 47 (1925), 981

Stamm, J.
Congo red as a reagent for boric acid
Pharmacia (1924); through *Chem. & Ind.*, 44 (1925), B204

Thornton, W. M., Jr., and Getz, D.
Use of p-nitrobenzoic acid as an acidimetric standard
Am. J. Sci., 9 (1925), 176; through *Chem. & Ind.*, 44 (1925), B191

Van Eck, P. N.
Macro-microreactions
Pharm. Weekbl., 62 (1925), 365

Vincent, Maurice
Determination of hydrogen-ion concentration by the electrochemical method
Thèse Doct. Med. (Paris, 1924); through *Bull. Sci. pharmacol.*, 32 (1925), 104

Wastenson, Hugo
Detection of cyanide in iodides
Svensk Farm. Tidskr., 29 (1925), 109

Weber, A.
Some application of electrometric analysis in the pharmaceutical laboratory
Pract. Drug., 43 (April, 1925), 26

Wróbel, A.
Polarimetric determination of potassium
Roczniki Chemji, 4 (1924), 287; through *Chem. & Ind.*, 44 (1925), B192

INORGANIC CHEMICALS.

Anon.
Test for carbonate and soluble salts in barium sulphate
Sudd. Apoth.-Ztg., 65 (1925), 108

Harrison, J. B. P., and Carroll, M. F.
Composition and evaluation of commercial sodium bisulphite
Chem. & Ind., 44 (1925), 127T

Rupp, E., Siebler, G., and Brachmann, W.
Evaluation of stibnite and sulphuretted antimony
Pharm. Zentralh., 66 (1925), 33; through *Chem. Abstr.*, 19 (1925), 1177

Siboni, G.
Additional notes on the incompatibility of sodium bicarbonate
Boll. Chim.-Farm., 64 (1925), 131

ORGANIC CHEMICALS.

Anon.
Lithium succinate
L' Union Pharm. (Feb., 1925); through *Chem. & Drug.*, 102 (1925), 449

Adkins, Homer, and Perkins, Philip P.
Dehydration of alcohols over alumina
J. Am. Chem. Soc., 47 (1925), 1163

Bailly, Octave, and Gaumé, Jacques
Composition and assay of the official glycerophosphates
J. pharm. et chim., 1 (1925), 241

Boyle, Ed., and Fabre, R.
Fluorescence considered as a criterion of purity of organic compounds
J. pharm. et chim., 1 (1925), 248

Callan, T.
Detection and determination of small amounts of α-naphthol and β-naphthol
Chem. & Ind., 44 (1925), 125T

Calzolari, F.
Detection of traces of urotropin, formaldehyde and methyl alcohol
Chem. Zentr., 96 (1925), 137; through *Chem. & Drug.*, 44 (1925), B227

Carrière, E., and Vilon, E.
Action of sulphuric acid on calcium oxalate
Compt. rend. Acad. sci., 179 (1924), 1402; through *Chem. & Ind.*, 44 (1925), B83

Dean, A. L., Wrenshall, R., and Fujimoto, G.
Synthesis of the anhydride of hydroxymercuriethoxy-chaulmoogric acid
J. Am. Chem. Soc., 47 (1925), 403

Delepine, Marcel
Structural relations between the terpineols
Perf. & Ess. Oil. Rec., 16 (1925), 10

Ghigliotto, Carlos
Detection of very small quantities of formaldehyde in cases of poisoning
Répert. pharm., 36 (1925), 65

Handy, J. A., and Hoyt, L. F.
Diethylphthalate. III
JOUR. A. PH. A., 14 (1925), 219

Howard, J. W.
Addition of chloroform to aldehydes
J. Am. Chem. Soc., 47 (1925), 455

Ingersoll, A. W.
Method for the complete, mutual resolutions of inactive acids and bases
J. Am. Chem. Soc., 47 (1925), 1168

Isnard, E.
Uranium cacodylate
Bull. Sci. pharmacol., 32 (1925), 131

Jakes, M.
Detection of cyclohexanol and methylcyclohexanol in soap
Seifensieder-Ztg., 96 (1925), 792; through *Chem. & Ind.*, 44 (1925), B214

John, H.
Sensitiveness of trypaflavin to light
Biochem. Ztschr., 155 (1925), 59; through *Chem. & Ind.*, 44 (1925), B226

Kolthoff, I. M.
State of silver in protargol and collargol
JOUR. A. PH. A., 14 (1925), 183

Kurtenacker, A.
Application of the bisulphite reaction of aldehydes in analytical chemistry
Ztschr. analyt. Chem., 64 (1924), 56; through *Pharm. Weekbl.*, 62 (1925), 357

Leulier, A., and Fouillouze
Estimation of arsenic and sulphur in novarsenobenzol and stovarsol
Bull. Sci. pharmacol., 32 (1925), 129

Mangin, Georges
Destruction of organic material by perhydrol in toxicological analyses
J. pharm. et chim., 1 (1925), 333

Mangin, Georges
Notes of Chelle's reaction for hydrocyanic acid
J. pharm. et chim., 1 (1925), 336

Radcliffe, Guy L., and Sharples, E. H.
Examination of the methods of estimation of vanillin, piperonal and coumarin
Perf. & Ess. Oil. Rec., 16 (1925), 20

Reif, G.
Analytical examination of synthetic acetic acid
Ztschr. Unters. Nahr. Genussm., 48 (1924), 277; through *Chem. & Ind.*, 44 (1925), B52

Rosenthaler, L.
Synthetic menthol
Pharm. Zentralh. (March 12, 1925); through *Chem. & Drug.*, 102 (1925), 450
Sen, Rajendra Nath, and Sarkar, Nripendra Nath
Condensation of primary alcohols with resorcinol and other hydroxy aromatic compounds
J. Am. Chem. Soc., 47 (1925), 1079
Schulek, E.
Berlin blue test for hydrocyanic acid
Pharm. Ztg., 70 (1925), 153
Snell, Foster D.
Laboratory production of viscose
Ind. & Eng. Chem., 17 (1925), 197
Strobinger, R., and Streit
Estimation of glycerin by oxidation with potassium and sulphuric acid
Pharm. Ztg., 70 (1925), 119
Tarugi, N.
Study of a reaction of formic aldehyde
Boll. Chim.-Farm., 63 (1924), 337; through *Bull. Sci. pharmacol.*, 32 (1925), 188
Thoms, H.
Detection of diethylphthalate in alcohol
Apoth.-Ztg., No. 95 (1924); through *Pharm. Ztg.*, 70 (1925), 119
Vanino, L., and Herzer, F.
Preparation of acetylsalicylic acid peroxide
J. pharm. Belg., 7 (1925), 45
Voorhees, Vanderveer, and Skinner, Glenn S.
Some new derivatives of barbituric acid
J. Am. Chem. Soc., 47 (1925), 1124
Zamparo, Aldo
Differentiation of naphthol and the condensation product of α-naphthol and formaldehyde
Boll. Chim.-Farm., 64 (1925), 97

CLINICAL AND DIAGNOSTIC METHODS.

Benguerel, C.
Determination of chlorides in blood
Répert. pharm., 36 (1925), 67
Benguerel, C.
Detection of urobilin and urobilinogen in urine
Répert. pharm., 36 (1925), 65

THE ARSENICAL SOLUTIONS.

No. 2.* *Liquor Acidi Arsenosi* (*De Valangin's Solution*).

BY H. A. LANGENHAN.**

History and Original Formulas.—According to Pereira[1] Dr. De Valangin, a Swiss physician practicing in London, introduced the *solutio solventis mineralis* into medical practice. Inasmuch as De Valangin died in 1805, this must have been done not long after Fowler's Solution made its appearance in 1783.

According to Dr. Withering[2] an aqueous solution of arsenic trioxide had been used under his supervision, but this solution decomposed. Hence he discontinued its use and substituted Fowler's Solution in its place. So little is known about De Valangin's work that it does not become apparent whether he attempted to make a more stable solution by adding the hydrochloric acid, whether he desired an acid solution in distinction to Fowler's alkaline solution, or whether he thought he had a distinctively new preparation.

This much becomes apparent from Pereira's account, that he sublimed a mixture of "arsenious acid" and "common salt," that the sublimate was designated as

---

* For No. 1 see "Trans. Wisc. Academy of Sciences, Arts and Letters," v. 20, or Bull. U. of Wisc., "Liquor Potassii Arsenitis".

** Associate Professor of Pharmacy, College of Pharmacy, University of Washington, Seattle.

[1] *Pharm. Jour.*, 8, p. 395 (1849).

[2] See Fowler's report, "Trans. Wisc. Academy of Sciences, Letters and Arts," v. 20.

"solvent mineral" and that his "solution of solvent mineral" was made by dissolving the sublimate in diluted hydrochloric acid. We are also told by Pereira that De Valangin presented the "Apothecaries Company with a quantity of his preparation, as well as with the formula for its manufacture." Thus it evidently came into general use.

That the "arsenious acid" does not undergo a chemical change when sublimed with sodium chloride, is pointed out by Pereira, who also states that, "The solution of solvent mineral is by some persons regarded as a solution of chloride of arsenic. Hence when its introduction into the London Pharmacopœia was proposed the following formula was suggested by Mr. Warington; Arsenious acid, gr. XXX; Hydrochloric acid, gr. XC; Distilled water, f. oz. XX. Dissolve the arsenious acid in the hydrochloric acid diluted with about 1 f. oz. of water; then add the remainder of the water to the solution." The chemistry of the reaction is explained by Pereira in the following words: "By dissolving the arsenious acid in the hydrochloric acid we obtain a solution of, either of the terhydrochlorate of arsenious acid or the terchloride of arsenic, $As_2O_3 + 3HCl = AsCl_3 + 3HO$." He substantiates this by pointing out that "According to Duparquier[1] the solution contains terchloride of arsenic."

Such was the state of our knowledge concerning this solution in 1849, at the time when the secret[2] preparation of the Apothecaries Company was considered for admission into the London Pharmacopœia in which it was made official in 1851 as *Liquor Arsenici Chloridi*. The first revision of the U. S. P. to adopt this solution was that of 1870. It applied to it the title of *Liquor Arsenici Chloridi*, the title of the London Pharmacopœia rather than that of the British Pharmacopœia being adopted. It has continued being official in both of these national standards, but has not found its way into other Pharmacopœias.

Comments on the Pharmacopœial Text.

Introductory Statement.

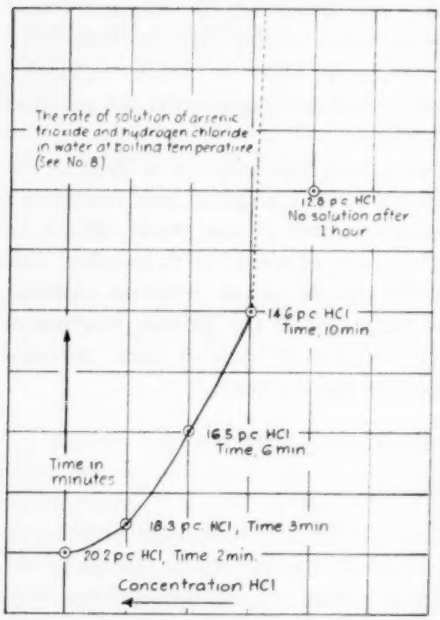
Although De Valangin's solution was introduced into the medical practice soon after Fowler's solution made its appearance, it was not made official in the United States Pharmacopœia until 1870. Hence there are but five written texts to be considered. Again as with Fowler's solution, the detailed comments on the text, whether based on the study of the literature of the subject, or on laboratory experiments or observations, are recorded in connection with those parts of the text to which they have reference. A better oversight over this part may be had by a mere glance on the text subjects commented upon:

1. Titles and synonyms
2. Definition
3. The form of arsenic trioxide used
4. Hydrochloric acid as an ingredient
5. Ratio of ingredients
6. Water
7. Amount of water used to effect solution
8. Solution of arsenic trioxide
9. Volume of finished product
10. Appearance of finished product
11. Qualitative tests
12. Assay
13. Dose

[1] *Jour. de Pharm.*, 27, p. 717 (1841).
[2] *Pharm. Jour.*, 2, p. 112.

1. *Titles and Synonyms.*—Dr. De Valangin first prepared his arsenical solution by subliming a mixture of "arsenious acid" and "common salt." The sublimate was called *Solvent mineral.* This was dissolved in diluted hydrochloric acid, and formed his *Solution of solvent mineral* or *Solutio Solventis Mineralis.* This title was probably used to differentiate this preparation from the alkaline solution of Fowler, which was introduced under the title *Mineral Solution* or *Solutio Mineralis.* The London Pharmacopœia of 1851, the first official text to contain this solution, applied the title *Liquor Arsenici Chloridi.* It was continued from this Pharmacopœia to the first British Pharmacopœia, of 1864, under title *Liquor Arsenici Hydrochloricus,* this title continuing up to the last revision.

The U. S. Pharmacopœia of 1870 introduced this solution under the title of *Liquor Arsenici Chloridi,* but changed it to *Liquor Acidi Arsenosi* in the 1880 revision, this title being also official in the last revision.


The rate of solution of arsenic trioxide and hydrogen chloride in water at boiling temperature (See No. 8)
12.8 p.c. HCl
No solution after 1 hour
14.6 p.c. HCl
Time, 10 min.
16.5 p.c. HCl
Time, 6 min.
Time in minutes
18.3 p.c. HCl, Time 3 min.
20.2 p.c. HCl, Time 2 min.
Concentration HCl

The change in title from *Liquor Arsenici Chloridi* to *Liquor Acidi Arsenosi* was evidently due to a better understanding of the chemistry of the solution. Duparquier[1] in 1841 explained the "increased solubility of arsenious acid in acidulated water" as being due to the formation of arsenous chloride, by the action of hydrochloric acid on the arsenic trioxide. This interpretation possibly led the revisors of both U. S. P. and B. P. to adopt the use of the above title. Stille and Maisch,[2] in 1879, called attention to the fact that arsenous chloride decomposed into arsenous acid and hydrochloric acid when dissolved in water, and state "the official solution contains therefore, simply the two acids." Oldberg and Wall[3] in 1884 state that "The title of chloride of arsenic was erroneously given this preparation in the Pharmacopœia of 1870. It does not contain chloride of arsenic but is a solution of arsenous acid in water acidulated with hydrochloric acid." Wood and Bache[4] in 1886 state that "The hydrochloric acid does not enter in combination with the arsenous acid, it merely aids in its solution. The British title is in our opinion to be preferred, because the U. S. name does not indicate the presence of the hydrochloric acid."

That the present title *Solution of Arsenous Acid* not only fails to indicate the presence of the hydrochloric acid, but also that it may be misleading as to the nature of the arsenic in solution, is quite evident. The revision committee for 1900 changed the title for As_2O_3 from *Acidum Arsenosum* to *Arsenii Trioxidum,*

[1] *Jour. de Pharm.,* 27, p. 717 (1841).
[2] "National Dispensatory," 2 ed., p. 839 (1879).
[3] "Companion to the U. S. P.," p. 184 (1884).
[4] "U. S. Dispensatory," 15th ed., p. 859 (1886).

the former title being regarded as a "misnomer."[1] If the hydrochloric acid does not react with the arsenic trioxide, the only explanation that might be offered as a reason for calling a solution of arsenic trioxide in water a solution of arsenous acid, is the hydration of As_2O_3 to the acid of which it is the anhydride. Although a one per cent solution of arsenic trioxide in water shows an acid reaction to litmus and several other indicators, it is apparently neutral towards a greater number. (See table of indicators and tests paper No. 1.)

2. *Definition.* A definition appears for the first time in the 1900 revision. A slight modification of the purity rubric adopted by the 1910 revision was probably necessitated by the pure Food and Drugs Act of 1906 which demanded reasonable limits rather than an absolutely fixed standard.

3. *Form of Arsenic Trioxide Used.*—The U. S. P. of 1870 directs that the As_2O_3 used should be in the form of "small pieces."[2] The editions of 1880 and 1890 simply specify "arsenous acid" and "arsenic trioxide" respectively;[3] and the 1910 edition directs "fine powder."

4. *Hydrochloric Acid as an Ingredient.*—This acid is used to facilitate the solution[4] of the arsenic trioxide in water. Two fluid drachms of "muriatic acid,"[5] equivalent to 42.6 grains HCl to 64 grains of arsenic trioxide were prescribed by the U. S. P. of 1870; two parts of "hydrochloric acid,"[6] equivalent to 0.638 parts of HCl, to one part of arsenic trioxide according to the U. S. P. 1880; fifty cubic centimeters of "diluted hydrochloric acid"[7] equivalent to 5.2 Gm. of HCl, to ten grams of arsenic trioxide according to the U. S. P. 1890; and according to the last two revisions fifty grams of "diluted hydrochloric acid," equivalent to 5 Gm. HCl, to ten grams of arsenic trioxide, was prescribed. The ratio of absolute hydrochloric acid and arsenic trioxide are herewith tabulated:

	HCl.	Arsenic Trioxide.
U. S. P. 1870	42.6 grains	64 grains
U. S. P. 1880	0.638 part	1 part
U. S. P. 1890	5.2 grams	10 grams
U. S. P. 1900	5.0 grams	10 grams
U. S. P. 1910	5.0 grams	10 grams

[1] "Proc. of the Pharmacopœial Convention," 1900, *Cir.*, 269, p. 1100.

[2] The explanation for this is found in the following statement made by the editors of the U. S. Dispensatory, 13th ed. (1872), p. 1267: "In making this preparation (Fowler's Solution) care should be taken that the arsenious acid be pure. This object is best secured by using the acid in small pieces instead of powder. Sulphate of lime is a common impurity in the powdered acid, and if present will remain undissolved, and cause the solution to be weaker than it should be." Although the U. S. P. of 1870 directs a qualitative test (complete volatilization) to be made, that would bar such impurity as sulphate of lime, the U. S. P. of 1880 is the first to direct the assay of "Arsenious acid."

[3] The description for arsenic trioxide in these two editions reads "A heavy solid occurring either as an opaque white powder or irregular masses of two varieties....."

[4] "U. S. Dispensatory," 15th ed., p. 859.

[5] "An aqueous solution of hydrochloric acid gas of the specific gravity 1.160," U. S. P.

[6] "A liquid composed of 31.9 per cent of absolute hydrochloric acid (....) and 68.1 per cent of water. Specific gr. 1.160," U. S. P. 1880.

[7] "Should contain 10 per cent of absolute hydrochloric acid." U. S. P. 1890 and 1900. "Not less than 9.5 per cent, nor more than 10.5 per cent of HCl," U. S. P. 1910.

5. *Ratio of Ingredients.*—De Valangin in his formula used 30 grains of arsenous acid to 90 grains of hydrochloric acid for 20 fluid ounces of the solution. The same ratio of ingredients existed in the London Pharmacopœia of 1851. The British Pharmacopœia of 1864, probably for the sake of uniformity, increased the arsenic content to that of Fowler's Solution, *viz.*, 80 grains to the Imperial pint; the 1885 revision increased the amount of arsenous acid to 87 grains, the amount of hydrochloric acid being 2 f. drachms for both revisions. The 1914 revision of the British Pharmacopœia prescribes 10 grams of "arsenous anhydride" to 12 mils of hydrochloric acid in 1000 mils of the solution. The ratio of arsenic trioxide to absolute hydrochloric acid for the several revisions is as follows:

U. S. P.	Arsenic Trioxide.	HCl.	Vol. of product.
1870	1.0	0.69	119 cc.
1880	1.0	0.638	100 cc.
1890	1.0	0.525	100 cc.
1900	1.0	0.50	100 Gm.
1910	1.0	0.50	100 Gm.

6. *Water.*—De Valangin in his original formula directed the use of distilled water. Both British (also London) and United States Pharmacopœias used distilled water throughout.

7. *Amount of Water Used to Effect Solution.*—De Valangin directed the use of one fluid ounce of water to effect the solution of his "solvent mineral" with the aid of the hydrochloric acid, as did also the London Pharmacopœia of 1851. The British Pharmacopœia of 1864 increased the quantity to four ounces, having at the same time increased the amount of arsenic trioxide from 30 grains to 80 grains. The next change was made in the 1914 revision where 500 millilitres of water are directed to be used to dissolve 10 grams of arsenic trioxide.

In every edition of the U. S. Pharmacopœia, the amount of water used to effect the solution of the arsenic trioxide and hydrochloric acid represents one-fourth of the total volume prepared.

8. *Solution of Arsenic Trioxide.*—As already pointed out, the chemistry of the reaction mixture of As_2O_3, H_2O and HCl may be regarded from the viewpoint of the hydration of the arsenic trioxide (for details see paper No. 1) and subsequent action of the HCl on the ortho arsenous acid. On the other hand it is well known that the reverse reaction does take place when water is added to arsenic trichloride. Hence the reactions as suggested by the following formulas are reversible, as indicated by the directions of the arrows.

At what point the equilibrium is reached for the system indicated by the U. S. P. formula for Liquor Acidi Arsenosi, is not known. The contrasting conceptions held with regard to the chemistry of this solution are indicated by the several names applied thereto, as shown under Synonyms. The possibility of an equilibrium without committance to any formula or formulas is suggested—though possibly not intended—by the B. P. title *Liquor Arseni Hydrochloricus.*

Two simple means suggested themselves for a purely chemical study of this phase of this liquor. The first, to ascertain how hydrogen chloride facilitates the solution of arsenic trioxide in water. The second, to ascertain what action water would have on arsenic trichloride dissolved in an indifferent solvent which at the same time was insoluble in water.

A. *Hydrogen Chloride as an Aid to Dissolving Arsenic Trioxide in Water.*—This problem was attacked upon the basis of the following theoretical considerations. In order to be able to work under ordinary conditions of pressure, the strength of the hydrochloric acid not greater than the octahydrate was chosen. For 100 mils of reaction mixture this would admit 20.2 Gm. of HCl to 10 Gm. of As_2O_3 taken for each experiment. This amount of As_2O_3 was chosen because of the rate of solubility of arsenous acid anhydride in hot and cold water respectively. 1.6 Gm. of As_2O_3 are said to be soluble in water to make 100 mils at 15 degrees centigrade. Its solubility in boiling water is recorded as being 6 Gm. in 100 mils. Hence a solution of 10 grams of arsenic trioxide in 100 mils of liquid must have been effected with the aid of the HCl. Inasmuch as the increase in volume of the solution due to the 10 Gm. of As_2O_3 was not considered as a factor of appreciable importance in this case, the amount of diluted hydrochloric acid used was always 100 mils merely as a matter of convenience. No attempt was made to attain absolute accuracy.

In order to be in a position to choose molecular ratios so far as possible, the amounts of HCl taken were based upon the following equivalents representing the action of one molecule of hydrogen chloride on one molecule of ortho arsenous acid,

$$\frac{As_2O_3}{197.92} \text{ equiv. } 2As(OH)_3 \text{ equiv. } \frac{2HCl}{2 \times 36.47}$$

Hence 10 grams of As_2O_3 would require 3.66 grams of HCl to change theoretically the hydrated As_2O_3 or $As(OH)_3$ to the monochloride dihydroxide, $As(OH)_2Cl$. Therefore the maximum number of molecules of HCl available with a hydrochloric acid not stronger than the octahydrate would be about 5.5 molecules. This would admit of a theoretical conversion of all of the $As(OH)_3$ to $AsCl_3$ and an excess of 2.5 molecules to prevent complete reversal of the reaction because of the solvent, water.

The experiments were carried out by adding 10 grams of arsenic trioxide to 100 mils of boiling water containing the required amount of hydrochloric acid representing one, two and three, etc., molecules of HCl, and immersing the mixture in a bath of boiling water until a clear solution resulted. The mixture was continually agitated and the time required to effect a clear solution recorded. The first concentration from which a clear solution was obtained was that representing $\frac{As_2O_3}{2}$ to 4HCl in 100 mils. Weaker acid concentrations gave no solution after one hour of heating. The results are herewith tabulated:

As_2O_3, Gm.	HCl, Gm.	Vol. of sol.	Time (min.)	Ratio.
10	12.8	100 mils	no. sol.	$\frac{As_2O_3}{2}$ to $3\frac{1}{2}$ HCl
10	14.68	100 mils	12, 10, 10	$\frac{As_2O_3}{2}$ to 4 HCl
10	16.5	100 mils	6, 6	$\frac{As_2O_3}{2}$ to $4\frac{1}{2}$ HCl

As_2O_3, Gm.	HCl, Gm.	Vol. of sol.	Time (min.)	Ratio.
10	18.35	100 mils	3, 3	$\frac{As_2O_3}{2}$ to 5 HCl
10	20.18	100 mils	2, 2	$\frac{As_2O_3}{2}$ to $5^1/_2$ HCl

Upon cooling the solution, crystals, apparently octahedric in shape, were deposited. According to H. Rose, "A solution of 2 or 3 parts of amorphous As_4O_6 in 12 parts of concentrated HCl aq. deposits crystals of the octahedral oxide when slowly cooled." (From "Watts Chemical Dictionary," v. 1, p. 312, 1890. Taken from Poggendorf's Annal. d. Phisik. u. Chem. 35, p. 481.)

That the hydrochloric acid aids in the solution of the arsenic trioxide can readily be concluded. Furthermore, the increased solubility of arsenic trioxide in water (see table) in the presence of hydrochloric acid would seem to indicate that a reaction had taken place between the hydrogen chloride and the arsenic trioxide. The fact that the arsenic trioxide crystallizes out from such a solution indicated that this reaction is not a quantitative one in the direction of the simple equation, but that its solution is a multiple phase solution.

In the comparison of the equivalent ratios with the ingredient ratios of the U. S. P. formula the following computations have proven helpful:

$As_2O_3 + HCl$
1 to 0.1842

$\frac{As_2O_3}{2} + 3^1/_2HCl$
1 to 1.28

$As_2O_3 + 2HCl$
1 to 0.367

$\frac{As_2O_3}{2} + 4HCl$
1 to 1.46

$\frac{As_2O_3}{2} + 4^1/_2HCl$
1 to 1.651

$\frac{As_2O_3}{2} + HCl$
1 to 0.367

$\frac{As_2O_3}{2} + 5HCl$
1 to 1.835

$\frac{As_2O_3}{2} + 2HCl$
1 to 0.734

$\frac{As_2O_3}{2} + 5^1/_2HCl$
1 to 2.018

$\frac{As_2O_3}{2} + 3HCl$
1 to 1.10

$\frac{As_2O_3}{2} + 6HCl$
1 to 2.202

9. *Volume of Finished Product.*—De Valangin originally prepared twenty fluid ounces, the Imperial pint. Likewise did the London Pharmacopœia of 1851, and the subsequent editions of the British Pharmacopœia. The 1914 edition of the British Pharmacopœia having wholly adopted the metric system, brings the volume of the finished product up to 1000 mils. According to the U. S. P. of 1870, the finished product was diluted to "exactly one pint." In 1880 "up to 100 parts;" in 1890 "up to 1000 cc.;" and in the last two revisions each "up to 1000 grams."

The ratio of arsenic trioxide to finished product is approximately as follows:

	Arsenic trioxide. Product.
De Valangin's Sol.	0.345 Gm. to 100 mils
Ph. London 1851	0.345 Gm. to 100 mils
B. P. 1864 and 1867	0.915 Gm. to 100 mils
B. P. 1885, 95, 1914	1.0 Gm. to 100 mils

U. S. P. 1870	0.84	Gm. to 100 mils
U. S. P. 1880, 1890	1.0	Gm. to 100 mils
U. S. P. 1900, 1910	1.0	Gm. to 100 grams

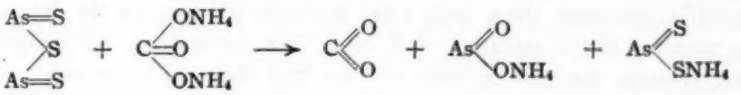
It becomes apparent that in order to make this solution correspond in strength to Fowler's solution the ratio of arsenic trioxide to finished product was increased considerably over that of De Valangin's original formula, and also that of the London Pharmacopœia.

10. *The Appearance of the Finished Product.*—The U. S. P. of 1880 and the editions following direct that the solution be filtered. No mention of filtering is made in the revision of 1870.

11. *Qualitative Tests.*—The U. S. P. of 1890 is the first one to contain a qualitative test and this only a descriptive one. Likewise the 1900 revision contains but this test. The last edition, that of 1910, gives one additional test. The first is a descriptive statement; the second a test for arsenic. The acid reaction of the solution described in the first test may be attributed to the hydrochloric acid present, also due to the hydrolysis of the arsenic trioxide. (See No. 8.) The second test: upon saturating the solution with hydrogen sulphide a yellow precipitate of arsenous sulphide is formed. This precipitate is soluble in Ammonium Carbonate T. S. The reaction with ammonium carbonate has been indicated as follows:[1]

$$2As_2S_3 + 2(NH_4)_2CO_3 = 2CO_2 + NH_4AsO_2 + 3NH_4AsS_2$$

Structurally the formulas involved may be represented in the following manner:



12. *Assay.*—From 1880 on the U. S. P. gives directions for the assay of this solution. The quantitative determination of trivalent arsenic as As_2O_3 is not only a check on the amount of arsenic trioxide employed, but also on the possible deterioration of the solution, brought about by the oxidation of the arsenous to arsenic, in the presence of water, as expressed by the following reactions:

$$H_2O + I_2 = 2\,HI + O$$
$$As_2O_3 + 2\,O = As_2O_5, \text{ or hence}$$
$$I_4 \text{ equiv. } O_2 \text{ equiv. } As_2O_3,$$
$$126.92 \text{ equiv. } \frac{197.92}{4} \text{ or}$$
$$0.012692 \text{ equiv. } 0.004948$$

The amount of As_2O_3 as determined by the prescribed volumetric assay varies to a slight degree. The U. S. P. of 1880, the first to introduce an assay method, states that 24.7 Gm. of the solution "should require from 48.5 to 50 cc. of volumetric solution of iodine"—("corresponding to 1 per cent of arsenious acid of the required purity"). The As_2O_3 equivalents of 48.5 and 50 cc., respectively, of $N/10$ I. V. S. are 0.9709 Gm. and 1.001 Gm. As the purity rubric for "arsenious acid" was "at least 97 per cent pure," ten grams, the amount directed to be used to make

[1] "Commentar zur Pharmacopœia Helvetica" (1896) p. 196.

1000 cc. of the Liquor, would represent 0.9700 gram As_2O_3 to 100 cc. of the solution. Hence, unless the "arsenious acid" used assayed slightly higher than the minimum U. S. P. requirement, the finished product would fall short by a very slight amount (within the limits of experimental error) of the given standard.

The U. S. P. of 1890 states that 24.7 cc. of the solution "should require from 49.4 to 50 cc. of decinormal iodine V. S."—("corresponding to 1 Gm. of arsenous acid in 100 cc. of the solution"). The As_2O_3 equivalents of 49.4 cc. and 50 cc. $N/10$ I. V. S. according to this revision represent 0.9883 Gm. and 1.004 Gm. respectively of As_2O_3 in 100 cc. of the solution. As the purity rubric for "arsenous acid" in this revision is "at least 98.8 per cent of arsenic trioxide," ten grams, the amount prescribed to make 1000 cc. of the Liquor, would represent 0.988 Gm. to 100 cc. of the solution. In this case the minimum requirement would be met.

The U. S. P. of 1900 states that 24.6 Gm. of the solution "should require not less than 50 cc. of tenth-normal iodine V. S.—" ("corresponding to 1 Gm. of arsenic trioxide in 100 Gm. of the solution"). The As_2O_3 equivalent of 50 cc. of $N/10$ I. V. S. according to this revision represents 0.9981 Gm. of As_2O_3 in 100 Gm. of the solution. The new purity rubric for arsenic trioxide is "not less than 99.8 per cent of pure Arsenic Trioxide." Hence ten grams of arsenic trioxide, as directed to be used for the preparation of 1000 grams of the Liquor, would represent only 0.998 Gm. of As_2O_3 to 100 Gm. of the solution. In this instance the conditions meet the requirement of 10 Gm. of arsenic trioxide, which represents 9.98 Gm. of As_2O_3.

The U. S. P. of 1910 merely demands a definite percentage strength, *viz.*, "not less than 0.975 nor more than 1.025 Gm. As_2O_3 in 100 Gm. of the solution," and makes no mention of the amounts of $N/10$ I. V. S. to be used. The purity rubric for arsenic trioxide for this revision is "not less than 99.8 per cent. of As_2O_3." It is quite evident, however, that the maximum limit of As_2O_3 content of the solution will probably not result when the prescribed ten grams of arsenic trioxide are used, as this represents only 0.998 Gm. of As_2O_3 to 100 Gm. of the solution. The lower limit of the rubric, *viz.*, 0.975 Gm. to 100 Gm. of solution, is undoubtedly to allow for a slight loss of arsenic trioxide, as determined by the assay process, due to the oxidation of the trivalent arsenic to the pentavalent arsenic.

Two factors influence the variations mentioned above: firstly, the variation in the As_2O_3 equivalent of $N/10$ I. V. S. due to changes in atomic weights, and secondly, the purity rubric of the arsenic trioxide. The cc. equivalent for 1880 was 0.004945; for 1890, 0.004942; for 1900, 0.004911; and for 1910 it is 0.004948. The purity rubric for arsenic trioxide for 1880 was 97 p. c. As_2O_3; for 1890, 98.8 p. c. As_2O_3; for 1900, 99.8 p. c. As_2O_3 and for 1910 it is 99.8 p. c. As_2O_3.

Inasmuch as only one gram of arsenic trioxide is used to prepare 100 grams of the solution, it becomes quite apparent that any solution assaying 1 p. c. As_2O_3 (the generally accepted U. S. P. requirement) would result only from carelessness in weighing, unless it be that the U. S. P. formula were ignored and the equivalent of 10 Gm. of 100 p. c. pure arsenic trioxide were used, or that a 100 p. c. arsenic trioxide were used.

13. *Dose.*—A dose is first prescribed by the U. S. P. 1900. This is designated as, "Average dose—0.2 cc. (3 minims)." The revision of 1910 likewise contains the dose given as, "Average dose—metric, 0.2 mil.—Apothecaries, 3 minims." This

corresponds with the dose of arsenic trioxide, *viz.*, 0.002 Gm. or $^1/_{33}$ grain. (For history of introduction of doses in U. S. P. see paper No. 1.)

(To be continued)

TEACHING THE USE OF THE MORTAR.

BY R. A. BAKER.*

In teaching the principle of grinding successive small portions of material rather than a single large portion, the following test has been found to be very efficient with a class of several hundred in freshman chemistry.

After a lecture demonstration and discussion of the proper method, each student is given in the laboratory an envelope containing 10 grams of cracked gypsum, previously freed from dust on a 20-mesh sieve. On the outside of this envelope he enters his name, the name of his laboratory instructor and the internal diameter of his mortar. This measurement is checked and initialed by his instructor. The class is then told that but two minutes will be allowed for grinding this gypsum and that the grade which each student receives on the exercise will depend upon the amount which he grinds fine enough to pass through a 60-mesh sieve. Beyond this the student is left to his own devices. At a given signal the grinding begins and at the end of the two-minute period a whistle (necessarily a loud one) announces that all grinding must stop. Each student then returns to the original envelope all material, ground and unground, and hands it to his instructor.

The grades are determined by actually sifting and weighing each sample. We have employed student help for this purpose, and are convinced that the expense is fully justified. The net cost to the department can be cut down by having the students grind some material, such as gypsum, for which there will be a demand later in the course. It is not necessary to make a quantitative separation of the powder for, if every sample receives the same treatment, the results will stand in the same relative order, which is the chief requirement in estimating the student's mark or grade.

In lieu of a mechanical shaker one can save considerable time by carefully following a few arbitrary rules to insure uniformity. (1) Use the same sieve for all samples. (2) Tap it sharply the same number of times after each sifting, first right-side-up and then up-side-down. (3) Use the same general motion. (4) Shake for 30 seconds only. (5) Have in the sieve one or more coins to aid in scattering the material. (Samples of gypsum, sifted in accordance with these rules, showed a 95% separation of the 60-mesh powder actually present.)

Over 1000 students, about half of them women, have already taken this test. The results have been analyzed in order to determine what allowance must be made for the size of the mortar and whether the same results could be expected from the women as from the men. This analysis appears in the following table:

	Weight of material.	Diameter of mortar.	Duration of grinding.	Weight of 60-mesh powder.	Extremes.
Men	10 Gm.	5 cm.	2 minutes	5.00 Gm.	1–10 Gm.
Men	10 Gm.	10 cm.	2 minutes	7.98 Gm.	2–10 Gm.
Women	10 Gm.	5 cm.	2 minutes	4.36 Gm.	2– 8 Gm.
Women	10 Gm.	10 cm.	2 minutes	6.46 Gm.	3–10 Gm.

* Professor of Inorganic Chemistry, Syracuse University.

By means of this experiment students are readily converted to the practice of attempting to grind at one time only slightly more material than will cover the bottom of the mortar. The wide limits shown in the last column of the chart can hardly be attributed to anything but failure to observe this simple rule.

It should be added that the project method of approach and the element of competition combine to make this experiment very interesting to both students and instructors.

A BRIEF DISCUSSION OF THE IONIC THEORY IN ITS RELATIONSHIP TO CERTAIN LIFE PROCESSES.*

BY ROBERT C. WILSON.[1]

All life processes be they animal or vegetable are complex, and all materials for carrying on these processes are complex. Animal matter shows on analysis (chemical) that it is composed of many elementary substances which have associated themselves into various combinations, constituting many different kinds and types of molecules which vary in complexity from two to perhaps many hundreds of atoms. We cannot go very far into tracing the many chemical changes under which these elements may pass as they enter into and pass through complex life processes, without an application of certain principles which have come to us through a knowledge of "ionization."

A BRIEF RÉSUMÉ OF THE THEORY OF THE ION.

Pure water or a perfectly dry salt is a non-conductor of electricity. When HCl or a chloride or other salt or acid is dissolved in water, it is then found that the solution will conduct electricity. Something then has happened other than the mere physical phenomenon of "solution."

When a substance, on dissolving in water, gives to the solution the power to conduct electricity, that substance is called an "electrolyte." When an electrolyte dissolves in water, and we find that it has given this property of acting as a carrier for electricity, we have reason to believe that the electrolyte, on dissolving, is divided into its constituent atoms or groups of atoms, and that each atom or group of atoms bears a charge of electricity. Further, it is found that certain of these atoms or groups of atoms bear a positive charge of electricity while others bear a negative electrical charge, as evidenced by the fact that when a current of electricity is passed through such a solution, the atoms bearing a positive charge will collect at the negative pole, while those bearing a negative charge will collect at the positive pole. *Such an electrically charged atom or group of atoms is called the "ion"* and the "ion" may be composed of one or many atoms, *i. e.*, Cl, OH, SO_4, C_2H_5, etc.

The "ion" must not be confused with the atom, *i. e.*, NaCl or HCl on dissolving in water give no evidence of free Cl, but at the same time by disturbing the elec-

---

* The address was delivered in response to a request from the Clarke County Medical Society, Athens, Ga.

[1] Dean, School of Pharmacy, University of Georgia.

trical charge of the "ion," it may be converted into the atomic state, and this very change is probably constantly taking place in body processes. In so far as the Cl "ion" is concerned, regardless with which chloride we may deal, its properties in so far as its "ionic" properties are concerned will be the same, *i. e.*, $FeCl_3$, NaCl, $ZnCl_2$, $HgCl_2$, etc. On the other hand on considering the metallic or positively charged ion, *i. e.*, Mg, Ca, Fe, Na or K, etc., the properties of these ions will always be the same regardless of what salt of the metallic ion is used, *i. e.*, $CaCl_2$, $CaBr_2$, $CaSO_4$, $Ca_3(PO_4)_2$. However, we must bear in mind at this point that ferrous and ferric, mercurous and mercuric, as well as other "ic" and "ous" salts or "ions" are entirely different in their physical, chemical and physiological properties except for the fact of their ready conversion one into the other through the addition or withdrawal of positive charges of electricity, and this phenomenon is constantly going on in body processes involving the ions of many elements.

The solubility of a salt in water determines the degree to which it can ionize, though it must be borne in mind that all readily soluble salts do not ionize to the same degree. We use the terms "weak" and "strong" to indicate the degree to which an electrolyte may ionize.

RELATIONSHIP OF IONIZATION TO OSMOTIC PRESSURE.

In any consideration of body processes, we cannot overlook the part osmotic pressure plays in all life processes. Osmotic pressure has been defined as "the force which determines the movement of water through or across the many membranes of living tissue." All electrolytes exert a certain influence to raise osmotic pressure and each electrolyte shows its own peculiar property in this direction. The influence of electrolytic dissociation has been proven to be the determining factor in this individual influence on osmotic pressure. All electrolytes do not dissociate into the same number of ions and it is this variation in dissociation which accounts for the variation in osmotic pressure with different electrolytes.

Having now some foundation as to the meaning of the terms "ion" and "dissociation," "electrolyte" and "osmotic pressure," we may attempt an application of these principles to physiologic processes:

Water, in a pure state, is dissociated into its component ions H and OH only to an infinitesimal degree, certainly not to an extent whereby it becomes a conductor of electricity; hence, pure water cannot have any appreciable osmotic pressure. When, as in this case, H and OH ions are present in the proportion to form water (HOH), and there is no excess of either ion, a condition exists which is known as "chemical equilibrium." There are, however, changes going on in body processes whereby this ratio between H and OH ions is being constantly disturbed, there being an excess of H ions producing an acid condition or an excess of OH ions producing an alkaline reaction or condition.

In normal saliva, a slight excess of OH ions is present, accounting for its mild alkalinity, this probably arising from the fact of the presence in saliva of an electrolyte or salt which on dissolving in the aqueous fluids of the mouth gives off free OH ions; and any condition which alters the normal alkalinity or concentration of OH ions has a direct effect upon the amylolytic enzyme in saliva destroying its digestive powers, and may result in the establishment of conditions conducive to disease. It is conceivable that the presence in great excess or the absence of some

particular ion (Na, K, Ca or Mg) accounts for such a change in saliva, but however this may be, there is some disturbance in the proportion of H and OH ions.

Likewise, in the stomach, under normal conditions, we find an acid condition, this being due to the presence there of free H ions. *In the light of the ionic theory, we cannot say that the stomach contents contain free HCl*, nor can this be proven. True, we find there free H ions and Cl ions, but we also find Na and K ions, and lactic and butyric acid ions. Whether the original secretion was composed of Na or K or Ca lactate or butyrate and free HCl, or free lactic and butyric acids and NaCl or KCl no man can prove for we find there in the stomach contents all of these ions. But this we do know, that the proteolytic enzyme we call pepsin is active only in the presence of a certain acid concentration, or as we may now more properly say "a certain H ion concentration." Any change in this normal H ion concentration results as we well know in digestive disturbance. If such a digestive disturbance should come, may it not be accounted for by the presence of an excess of certain positive or negative ions or perhaps a diminution of these in the secretory vessels themselves? True, it must be that a proper ratio between H and OH ions must exist to give to these vessels the proper stimuli.

In the intestinal tract, there prevails under normal conditions a mild alkalinity which is accounted for by the presence of certain bile salts which in aqueous medium give off free OH ions. It appears that this mild alkalinity is necessary for the activation of the pancreatic enzymes, and any material increase or decrease in this concentration of OH ions results in digestive disturbances.

In such a brief and casual consideration of this very extensive and interesting subject, for the lack of time, we may not at this point pause to consider why H and OH ions influence the activity of these digestive enzymes, though such a procedure would be logical, but it would lead us into fields which are highly speculative as yet and but little understood. But we may stop to state our knowledge of the factors which increase or decrease H and OH ionic concentrations.

All acids and certain other electrolytes when dissolved in aqueous fluids give free H ions, and all bases and certain other electrolytes when dissolved in aqueous fluids give free OH ions. These base and acid forming radicals are present in our food and water, and are constantly undergoing chemical changes in the tissues and elsewhere in the body, affecting in turn the osmotic pressure in the tissues and the concentration of H or OH ions. The theory suggests itself that osmotic pressure is the determining factor in various body secretions especially in those cases where enzymatic influence is a factor.

In considering the ionic and osmotic properties of blood, the situation becomes even more complex perhaps than we have thus far encountered, because of the complex character of blood itself and the varying changes it undergoes in its circulation. There is present in blood at some time in its circulation, perhaps, some or all of the various ions which enter the body in food and water or which are formed in the tissues during digestion, secretion, absorption or excretion. A variation from the normal ionic concentrations results very promptly in variations in osmotic pressure, variations in assimilation, secretion, and excretion and in the concentration of H or OH ions with a resulting acid or alkaline reaction. Under normal conditions blood is perhaps slightly alkaline, though, during circulation, various acid products are being formed, among which may be mentioned carbonic acid. This

is formed in the capillaries and during its passage through the venous system circulating in an aqueous medium we would expect to get free H ions and an acid reaction, but under normal conditions there are present certain electrolytes which suppress the ionization of this weak acid, and hence no H ions or acid reaction can exist. The elimination of CO_2 by the lungs removes this danger of an acid blood and to further offset the possible presence of H ions in blood, a supply of OH ions must be continually formed. To supply these alkaline OH ions, strike electrolytes, which in aqueous fluid yield them, must be constantly supplied since they are being constantly eliminated in the form of sweat, urine and feces.

A further factor of the presence of a proper concentration of electrolytes in the blood is the consideration of the osmotic pressure which is exerted within the blood cells—a lowering of electrolyte content resulting in a distension or possible rupture of the cell, while a heavy concentration of such electrolyte may result in compression of the cell. The positive or alkalinizing ions which are normally present in the blood are Na, K, Ca, Mg, NH_4, and Fe, while the negative or acid producing ions are Cl, SO_4, PO_4, uric, formic and other organic acid radicals.

A diet composed largely of vegetable foods which are rich in alkaline salts may result in hyper-alkalinity, while a diet of meats or other proteids which are rich in S, P, and N compounds may result in a hypo-alkalinity or conceivably an acidosis.

If time permitted, we might trace this matter of H and OH ion concentration and osmotic pressure in their relationship to urine, feces and milk secretions, but the principles already outlined will be left for your own application in these cases. For many years, we have been clinically aware of the presence of iron in the blood and of certain of its functions there, though perhaps we do not even yet consider its function properly in the light of possible explanations by the aid of the ionic theory. We have also observed clinically the presence of calcium and magnesium in the blood and other body products and perhaps noted the necessity of their presence in the clotting of blood, but other than this clinical observation we have not as yet attributed any other function to them.

We may also mention the fact of our knowledge that iodine is a necessary constituent for the proper functioning of the thyroid gland, but further than this observation we have not attempted to go. While as yet we have no knowledge concerning the activating principles in the adrenal and pituitary bodies, there is no doubt but that our knowledge of these now obscure products may be enriched within the near future by the application of the ionic theory to their study. Other than the three elements mentioned Fe, Ca, and I we are not now aware of any special function of the various other ions or electrolytes which are known to be essential for proper body processes and maintenance.

A study of the normal excretory products of the body reveals the presence of twelve or thirteen elements, and surely we may hope to be able to determine the particular physiologic function of each within the very near future.

MAKING MORE CORDIAL THE RELATIONSHIP BETWEEN DOCTOR AND DRUGGIST.*

BY J. G. BEARD.

Every thinking doctor and druggist recognizes that the professions of medicine and pharmacy are interdependent, and that the closer and more harmonious the relationship between the two becomes the more each group will be advantaged. Any opportunity, therefore, which offers a chance to strengthen the bond between them should be seized with eagerness. We as pharmacists must see to it that we do our part fully to guarantee this rapprochement; if necessary to do more than our share since candor compels us to admit that we stand to gain more from the union than do the doctors.

Various ways offer themselves to bring about this cordiality of relationship, most of them being obvious. One method in particular is effective and this paper is concerned with that method. The other plans have been discussed lengthily, but this plan has had but little publicity, at least in print.

After a physician receives his diploma and begins his practice, he has usually formed his own conclusions concerning druggists and their place in his scheme. Under certain conditions he may change these conclusions, but ordinarily they remain a fixed part of his thinking. It is important then that he be shown, while still susceptible to evidence, the value of pharmacy both to himself and to mankind generally. Entering upon his career with a proper appreciation of the drug business, he becomes a distinct asset to pharmacy. Such appreciation develops usually out of a certain sort of instruction gained in medical school. Most students, whatever their curriculum, reflect in their thinking the ideas of their preceptors. If, for example, a professor of materia medica like the late Dr. Potter has a lowly opinion of pharmacy and pharmacists, there will result from his teachings a group of doctors prejudiced against druggists; but if, on the other hand, the teacher be like the well known pharmacologist, MacNider, who holds druggists in high esteem, then the students of such a man are prejudiced in favor of pharmacy and its practitioners, and such favor is a valuable asset to the drug business generally. All of which is by way of saying that the best time, almost the only time it sometime seems, to work for a mutual understanding and sympathy between doctors and druggists is while the two groups are still in college.

Two ways are open to bring about this understanding. (We will omit reference to methods to increase the regard of the pharmacist for the physician—that will come in another place.) One is for druggists and teachers of pharmacy to talk with professors in medical schools and seek to secure their coöperation in placing before the embryonic doctor the value to himself and to the public of the right sort of drug service; to impress him favorably with the character of man who makes up the bulk of the nation's druggists; and to impress upon him also the advancement in pharmaceutical standards which is now so rapidly going on. Many such professors will gladly do this if properly approached. The chances are that they have simply not thought of the matter at all. Another way is for schools of pharmacy located in institutions which also have schools of medicine, to endeavor to have introduced into the curricula of the latter, specialized courses in pharmacy, taught

* Section on Education and Legislation, A. PH. A., Buffalo meeting, 1924.

by some member of the pharmaceutical faculty. No one questions the value to a physician of a knowledge of certain phases of pharmacy, and it ought not to be difficult to bring about the addition of such a course. While the medical pharmacy is being taught, it will be appropriate to carry on the missionary work mentioned above so that the medical student will gain, while he is still impressionistic, the right appreciation of his co-worker, the druggist.

For twelve years I have taught medical pharmacy in the university with which I am connected, and I have never lost a legitimate opportunity to elevate the druggist in the minds of the oncoming crop of doctors in our section. The task has been as easy as it has been pleasant, and the results have been increasingly gratifying as practice has improved my ability properly to place before the youthful medicos a picture of the present-day, intensively trained pharmacist who can and who would like to be a close-working partner in the crusade against disease. I like to think that as these students finish their medical education and go out into the world they will not only be slightly better doctors as a result of their work under me, but that they will also have a higher conception of the men into whose hands will go their recipes for pain and disease.

CHAPEL HILL, N. C.,
August 19, 1924.

AMERICAN PHARMACEUTICAL ASSOCIATION COMMITTEE ON RESEARCH.

The AMERICAN PHARMACEUTICAL ASSOCIATION has available a sum amounting to $450.00 which will be expended after October 1st, 1925 for the encouragement of research.

Investigators desiring financial aid in their work will communicate before July 1st with H. V. Arny, Chairman, A. PH. A. Research Committee, 115 West 68th St., New York, N. Y., giving their past record and outlining the particular line of work for which the grant is desired.

"THE MASK" OF THE KAPPA PSI PHARMACEUTICAL FRATERNITY.

The January issue of *The Mask* is an interesting number and presents many faces known to pharmacists; among them: J. Dawson Reeder, Ivor Griffith, Grand Regent W. Bruce Philip, A. R. Bliss, L. K. Darbaker, W. G. Crockett, H. A. Langenhan, Geo. W. McBride, G. L. Curry, H. O. Haeusgen, F. D. Stoll, J. G. Noh, F. J. O'Brien, F. S. Ward, P. H. Dirstine, W. F. Sudro, G. L. Barone, R. H. Raabe. Also groups of various chapters—Columbia University, Medical College of Virginia, Massachusetts College of Pharmacy, Philadelphia College of Pharmacy and Science, Louisville College of Pharmacy, New Jersey College of Pharmacy, Western Reserve University, University of California, Union University, Oregon State College, University of Pittsburgh, Creighton University, University of North Carolina, Washington State College, North Dakota State College, Ohio Northern University, University of Nebraska, University of Oklahoma.

NARCOTIC PRESCRIPTION LIMITS REMOVED BY SUPREME COURT.

The government has lost its fight to restrict physicians under the Harrison narcotic law to prescribing only sufficient narcotic drugs when a patient is to administer them himself to be a curative in its effect upon the narcotic habit, as a result of the United States Supreme Court decision in the case of C. O. Linder against the United States, the opinion which was handed down by Justice McReynolds. Dr. Linder is a physician at Spokane, Wash.

In the lower courts the government won its contention that narcotics could not be prescribed in such quantities as to enable the patient to sell the drug or to administer to himself a dose larger than necessary to effect a cure, but the Supreme Court held that the government cannot control a physician in this way; that the law is a revenue measure; and that the court cannot conclude, because Dr. Linder prescribed for an addict that he acted unwisely or improperly. The lower courts were therefore overruled.

BUILDING UP A PHARMACEUTICAL PRACTICE ON SCIENTIFIC LINES WHERE COMPETITION WILL FIND IT DIFFICULT TO FOLLOW.*

Before beginning his address Mr. Jones stated that he was pleased to see so many young men and women present for the future of pharmacy is in their hands. He continued—"There are not enough people passing the average drug store in the Northwest to tempt any young person, thoroughly prepared and thoughtful, to spend the major part of his or her time in merchandizing. In a report of the National Association of Retail Druggists figures were presented which might be used to support that statement.

"The figures are something like this: the average volume of drug business per store throughout the United States is $25,000 annually. Of that, 28 per cent is represented by merchandise—by sundries; 22 per cent by patent medicine or proprietary articles; 14 per cent by soda fountain business; 10 per cent by prescription business; rubber goods, by 3 per cent, etc.

"We will combine two of the items—merchandise and patent medicines—which represent about one-half of the volume of business of the average drug store, on which the gross profit is about $33\frac{1}{3}$ per cent. The average overhead is about $28\frac{1}{2}$ per cent—that leaves 5 per cent net profit on $12,500—on one-half of the volume of business—about $600 net profit. That is the average store in the United States. The soda fountain business might make a little better or poorer showing, I am not sure which, because I have not had experience; the cigar counter is less profitable, I am satisfied, and the rubber goods bring better returns.

"Let us discuss the showing the prescription department makes. There is 10 per cent of the volume of business—a comparatively small percentage. If you will stop to consider, you will find 60 per cent gross is a reasonable amount to calculate on any prescription department. Now, the difference between 28 per cent and 60 per cent leaves a large margin; so that 10 per cent of the annual business will represent a profit more than equal to the half represented for sundries and patent medicines, which are distinctly articles of merchandise.

"If 10 per cent will show a profit more than equal to 50 per cent, why isn't it logical to develop that end of your business? Why isn't it business to develop that end of your business? You say, 'It takes too long;' or 'It is impossible in the community in which I live,' or give various other excuses; but they do not cover the case. Almost anything is possible if you set your mind to it, even in the community in which you live; you can do it in a way to fit your community.

"I am sure you will pardon me if I become just a little personal. I have with me this morning some things I would like you to see and criticize and ask questions about. In this box there are miscellaneous assortments, but of two sizes only, of compressed tablets of different materials, all made at my store. We have made hundreds of thousands of them. We do not make all lines of them, by any means, and I do not advise you to do so. But it is convenient occasionally to be able to make compressed tablets—you can understand why.

"You may think that a difficult operation; it is not—you must be careful

---

* Parts of an address by D. F. Jones of Watertown, So. Da., before Scientific Section of Minnesota Pharmaceutical Association and Northwestern Branch, A. PH. A.

about the granulation of the material; the compression is a very simple matter. Such work impresses the physician, especially, if he desires a tablet of a certain formula, which you can make instead of sending the formula to a far-away manufacturer, necessitating a wait before dispensing.

"I have an assortment of ampuls—this is one of chlorine—we have ampuls of various kinds; some we make from day to day. I would not advise the making of all your ampuls; it would be impossible. We only do the work in a particular line; about all of the ampuls we prepare are what might be termed emergency products.

"In this day physicians desire many preparations in ampuls. What does it mean? It means, unless we prepare the ampuls we are losing opportunities; if we buy them, they simply pass through our hands at a small profit, and we lessen our professional standing—the inference is we are not able to do the work.

"It is not a difficult operation at all. The technique is something you will have to work out, and your apparatus must be right; you can use a burette for an ampul filler; you can make the glass tubes yourself. The autoclave is the thing to be particular about—I believe it would be a problem for some of our colleges of pharmacy to work out a good one. The market at present does not offer one that is exactly suitable for the retailer's use. It must be absolutely tight, otherwise, during sterilization of the materials, the ampuls will burst. The autoclave cannot be opened until the temperature has been reduced or an accident will result.

"In the work of preparing ampuls, we find from experience that the demand is growing rapidly. The physician appreciates very much the convenience of sending in a formula and, in the course of a few hours, having the ampuls ready for administration. In my experience, I find physicians suggest, occasionally, the stocking of, for emergencies, certain formulas. That part of our business is growing quite rapidly. What is the result of it? It is not altogether to be figured from the standpoint of direct profit, but in the professional standing which is established thereby.

"If the pharmacist establishes himself in a community as one ready to give service in emergencies, he is usually thought of at other times. There is scarcely a day goes by without a call from a physician to help him out, and he does not forget us at other times during the day; he frequently informs his patient of this service and we profit in that way.

"Such work has a tendency to build up the part of your business represented by the 10 per cent. If you can build that up to 50 per cent of the volume—which is not a difficult thing to do at all—so that 50 per cent of your volume is represented by the prescription department, and your net profit is the difference between $28^1/_2$ and 60 per cent, then the total net profit is increased materially. I hope you will all agree with me that it is worth your while to give very close attention to that part of your business.

"In my experience, on numerous occasions, I have been called upon to assist the physician and nurse at the bedside of the patient; I have worked all night in connection with saving a patient's life. I have been called upon to pass upon the cause of death of some person who has not had medical attendance. These things

come naturally to a person who gives careful attention to the prescription department in his store.

"Too many are placing the prescription department over in some dark corner, and not out where it is prominent. I may have the opportunity of arranging another store before I retire and, in that event, I am going to make the prescription department a more prominent feature.

"The trouble with the young men of to-day is largely this: they cannot stand competition. There are here present this morning a number of young men and women who are recent graduates in pharmacy; perhaps they are engaged in business, or are expecting to go into business. To them I would say—If you are under the tendency of the times you have the idea that you are thoroughly prepared—much better prepared than the man with whom you served your apprenticeship; yes, you are even better prepared than the men who instructed you in college! That is quite a common feeling, I think, of young men and women. It is natural.

"If in business, you find, after some experience, the department store is tempting your customers away by cutting the prices on certain drug-store articles—articles you are handling—your resolve is, 'I will go them one better! I will cut below them.' You must consider that they have, perhaps, a thousand dollars to your one, and, what is more vital, they have back of that article on which they cut the price to attract people to their store, merchandise which they can sell your customer, in larger quantity, at a very large profit. That is what they are after and, therefore, they have an advantage over you—you are at such a disadvantage that every time you attempt to meet them in competition you lose.

"Around the other corner is a Greek. It is quite the common practice these days for the average drug store to operate a soda fountain and luncheonette. This Greek is operating just such business successfully. The crowd seems to be going to his store. You say, 'Who wants to trade with a Greek when there is a pharmacist here ready to serve?' So you go into competition with this Greek, but the Greek can live on what you waste, figuratively speaking, so you are up against two competitors who outclass you.

"The result is, in a short time, you are kept so busy working to get the dollars to pay your wholesale bills that you have not time to think or to read or to keep up to date on scientific matters. Day by day, you forget what has been taught you in the college of pharmacy, instead of improving your mind, so that in a few years you become incompetent. It is difficult for you to serve the public as you should. You have forgotten all the things you once knew, because it has been necessary for you to look after the dollar to such an extent that everything else has been crowded out.

"You are a good deal like the trotting horses—we have all watched races on the track. We have observed the leading horse coming down the stretch; perhaps he is our favorite. Another horse is catching up, and finally is neck-and-neck with our favorite. What happens? There is a break. The leading horse loses its gait; drops behind; is out-distanced by the other horse.

"That is just the trouble with us to-day in the drug business. We cannot stand competition. We must not permit the other horse to come up neck-and-neck; if he does, we break, and we drop behind in the race.

"My suggestion is to pay very little attention to competition. Outline your

own policy and put your ideas into shape so that you can carry out a certain line of endeavor, and then stick to it. Don't recognize competition; that is, center your efforts on your policy and plan.

"I do not carry the stock a great many of my competitors carry and, frequently, have calls for articles not in stock. I have my own ideas about those things. Strangers come in and inquire for some article, and I say, 'I am sorry I cannot supply you to-day.' 'Will you direct me to some other drug store?' My reply is—'This is the only drug store in town.' Sometimes they don't see the point, but soon they smile, and before they pass out, I direct them to some other place where they can procure the article they want.

"I have mentioned the making of tablets and the filling of ampuls; I might mention the making of volumetric solutions and sterilized solutions for intravenous injections and various other demands the pharmacist can create; there is no limit to the possibilities. You young men and women may not be interested in the articles mentioned, but there are many other lines of endeavor in which you can profit, if you are interested. What I am endeavoring to do is to interest you in thinking along just a little different line from the average pharmacist—away from excessive merchandizing and more toward professional practice.

"We are deluged with propositions of merchandizing until we do not know just where we are at. If we think as little as possible about them and more about the professional service we can give to the community and physicians, we will be doing ourselves and our communities a real service.

"In my opinion that is the vital thing to which we should direct our endeavors. You take the $25,000 average and compare that with the store to-day that is doing $100,000, and I will venture to say the store doing $25,000 annual business, directed properly, will show a greater net profit than the one doing $100,000. I am speaking of stores located in towns of about 10,000 population. I am not speaking of city stores, because I know very little about them, but I think the same principles will apply there. I hope you will think about these suggestions. If the younger pharmacists will maintain and develop the interest of the Scientific Section, we can hopefully look to the future."

PHARMACEUTICAL EXHIBIT AT THE MEETING OF THE AMERICAN MEDICAL ASSOCIATION IN ATLANTIC CITY.

The Philadelphia Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION has undertaken the preparation and display of the more important drugs and preparations of the new Pharmacopœia as part of the scientific exhibit of the A. M. A. Convention, May 25–29. Many may remember a similar exhibit in Atlantic City in 1909, when very effective publicity was given to official preparations during the annual A. M. A. meeting.

On Friday afternoon, May 29th, several papers will be presented before the Section on Pharmacology and Therapeutics as a feature of the exhibit, one by Dr. R. A. Thatcher, of New York. This meeting will be held in the Gold Room, Chalfonte Hotel. Members of the A. PH. A. will also be invited to be in attendance on certain days of the convention to present the material to visiting physicians. All pharmacists are cordially invited to be present at the meeting of the section and visit the exhibit.

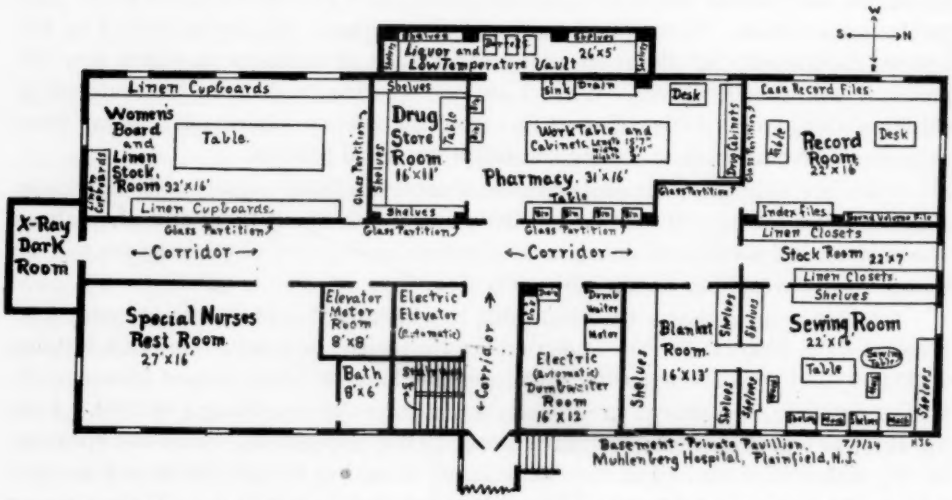
The Committee is composed of Dr. H. C. Wood, Jr., John K. Thum, Ivor Griffith, Charles H. LaWall, Ambrose Hunsberger, and E. Fullerton Cook is the Chairman.

A HOSPITAL PHARMACY.*

BY HENRY J. GOECKEL.[1]

"If you would have a thing done right, do it yourself" is a saying which applies to the organization of hospital pharmacies as well as to many other activities. The Hospital Section of the AMERICAN PHARMACEUTICAL ASSOCIATION is perhaps the only organized body capable of properly developing this branch of hospitalization.

It behooves each member of the Section employed in an institution affording good facilities to describe the pharmacy department. The description should include how it functions and coördinates with the rest of the hospital activities. The things in which it is particularly efficient should be noted as well as those which are not satisfactory from a pharmaceutical and institutional view.



Floor Plan of Private Pavilion Basement and Pharmacy, Muhlenberg Hospital, Plainfield, N. J.

In this way comparative data can be accumulated which will be of value for furthering pharmacy. It will afford a means of presenting data for the governing bodies and for the architects to use in planning hospital organizations and construction.

To this end the plans, photographs and a concise description of the pharmacy of Muhlenberg Hospital at Plainfield, New Jersey, will be presented. A year or more ago room had to be provided for an enlarged linen department and for a record department. The institution decided at the same time to provide a room for the Women's Board to meet and to prepare supplies, and also a new pharmacy, as the one it had was inadequate.

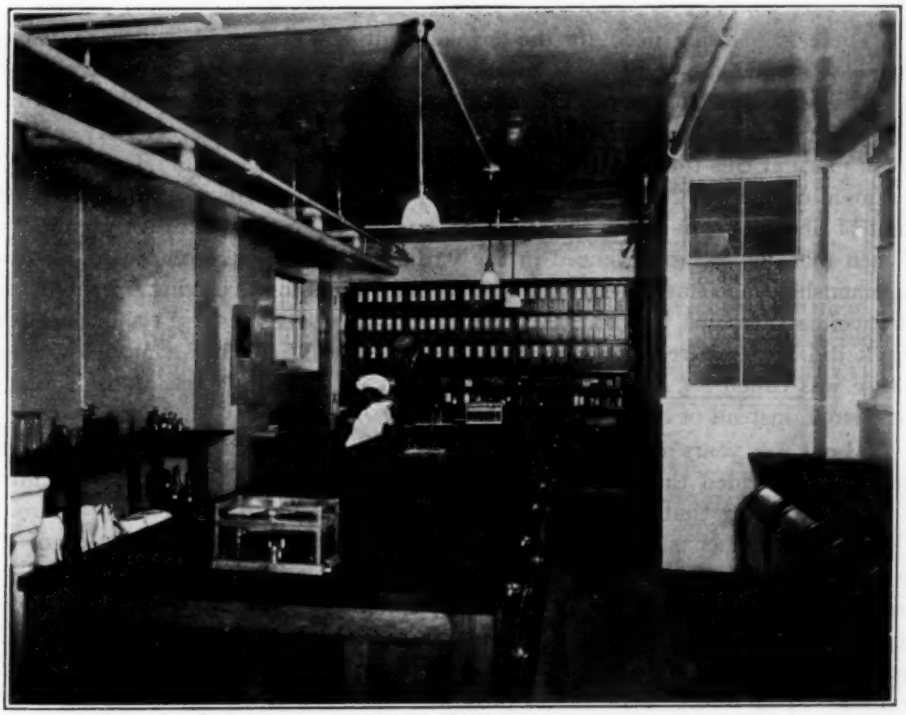
---

* Read before Section on Practical Pharmacy and Dispensing, A. PH. A., Buffalo meeting 1924.

The paper was accompanied by three photographs—Drug-store room, Pharmacy, View of vault from pharmacy; two drawings—Ground plan of hospital, Floor plan of private pavilion, basement and pharmacy. Half-tone of the pharmacy and etching of the floor plan are included in the article.

[1] Consulting pathologist, Somerset Hospital, Somerville, N. J.

The pharmacy, as will be seen from the photograph, is unusually spacious and is ample for any needs. It differs from that in many institutions in having the drug-store room and the vault as part of the pharmacy. The vault is beneath the entrance to the building. This is of very heavy stone construction, as one and a half foot solid stone columns are supported by this foundation.



Pharmacy, Muhlenberg Hospital, Plainfield, N. J.

The department is conveniently located near the electric elevator, dumb waiter and stairs. It is not connected with the clinic unit as would perhaps be advisable in large metropolitan hospitals. The community in which this hospital is located has very efficient charity and visiting nurse associations, so no dispensary pharmacy is needed.

LANKENAU HOSPITAL OPENS RESEARCH LABORATORY.

Donated by Rodman Wanamaker, the Research Institute of Lankenau Hospital, Philadelphia, started in its work the last week of April without official announcement or display. Due to Mr. Wanamaker's idea that the advanced medical research work to be conducted here needs no publicity or ostentation, the dedication by him was a private one, to which none but members of the staff and a few friends were invited.

The Research Institute is a 3-story, fireproof, brick building. So far, ten rooms have been fully equipped, and eighteen co-workers and assistants comprise the staff of Dr. Stanley P. Reimann.

THE DEPARTMENT OF THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES

THE DEVELOPMENT OF A COURSE IN "COMMERCIAL PHARMACY."

BY THEODORE J. BRADLEY.

There is pressing need for the development of a high grade course in "Commercial Pharmacy," or business methods for pharmacists, and for several years the Massachusetts College of Pharmacy has been working at this problem, as has been described in previous papers, so a report of further progress may not be out of place at this time. For a number of years this College had offered the conventional course in "Commercial Pharmacy," as a part of the work in the department of pharmacy, in which the students listened to special lectures by a number of men more or less experienced in the various lines of work considered, such as salesmanship, accounting, advertising, window dressing, banking methods, insurance, partnerships, and so on. It was found that such a course was interesting, but it did not give results of much value and it was felt that a more thorough course was called for in which the students would actually work at the subjects considered, instead of listening to talks about them.

About five years ago, in 1920 and 1921, the question was thoroughly studied and it was decided that the traditional course in pharmacy gives the minimum technical training that is needed by all pharmacists, but at the end of this road, which all pharmacists must travel, the path divides. A small proportion of the students of pharmacy wish for further study along scientific lines and they are provided for in most colleges of pharmacy by graduate courses leading to higher degrees. The greater number of students, however, are more interested in the commercial aspects of pharmacy and they want only the minimum professional training. Heretofore, little or no provision has been made for imparting sound commercial training for these large numbers of students and it was thought that a graduate course in "commercial pharmacy" could be offered to advantage, as is now being successfully done in general business methods by several universities and colleges.

The aid and coöperation of the Graduate School of Business of Harvard University, the Liggett organizations and others interested were secured to develop such a course as was planned. It was logically worked out and never failed to get the interest and approval of pharmacists when it was described to them, but it did not succeed, because students failed to appreciate the value of the work and did not enter the class in sufficient numbers to make it worth while to continue the course on this plan, and it was necessary to modify it. During the three years that the original plan was followed it was clearly demonstrated that the idea of teaching commercial subjects in a pharmacy school by the laboratory method was fundamentally sound, and a great deal of material for a course based on this method was accumulated.

During the past two years, the work has been rearranged, to be taught during each year of the new three-year course leading to the degree of Graduate in Phar-

macy, and it is now a required subject in that course. It is expected that it will ultimately become a major subject, making a fourth department of study, added to chemistry, materia medica, and pharmacy, which have been the three major departments of work in the pharmacy course.

At present, the work in this subject occupies about four hours a week for each of the three years. During the first year of the course the student is given instruction in what will be most immediately valuable to him as a clerk in a retail store. Salesmanship, show-card writing, and window display are the practical subjects studied. As much of this work as possible is taught by the laboratory method. In salesmanship the student practices selling before the class, and the good points and those which can be improved upon are brought out by discussion. The work in show-card writing is practically all laboratory work. In window display every student has the opportunity to try his hand at setting up an exhibit. The theory work in window display covers the artistic elements, including a discussion of colors.

The introductory lectures on the theory of salesmanship are informal, the class as well as the instructor contributing. Among the topics considered are selling one's services, the relation of psychology and salesmanship, instincts, the sales process, suggestion, handling objections, types of customers, study of the goods, and improvement of the salesman himself.

In show-card writing, both brush and pen work are given, practice in certain fundamental letter forms being followed by the construction of actual signs. The study of an alphabet is followed by the making of words, which brings out letter spacing, and then by the completion of an entire card. Instruction is given as to the placing of the parts of the sign to secure the best appearance. At first the student copies cards, but afterwards he originates cards of his own.

During the second year the student passes from the more elementary work to that which has less immediate application but more ultimate value, whether he eventually becomes a proprietor or remains an employee. Law, accounting, and the theory and practice of advertising are the subjects studied. Knowledge of these should make the student a more valuable clerk, as well as lay the foundation for the work of the senior year.

In the study of law, the method used is a combination of the lecture and case methods, in order to give the best results in the time available. A discussion by the instructor of the principles involved is followed by a discussion of actual cases by the class. The principles of commercial law and the special laws affecting the druggists are thoroughly studied. Under commercial law, contract, sales, agency, and negotiable instruments are treated, giving knowledge which will enable the druggist to keep out of difficulty in his business relations, while those parts of the Harrison and Volstead acts which affect the retail druggist receive attention.

In accounting, double-entry bookkeeping is taught, as best adapted to the needs of the retail drug store, the object being not to make bookkeepers of pharmacists, but to enable the retail druggist to make use of double-entry bookkeeping in his business. The study of accounting is made very effective by the large amount of practice assigned to each member of the class. Each one works out several systems of accounts, one designed for a small business, one for a larger business,

and one for chain stores. In this work the student learns the source and preparation of business statements.

In advertising, the underlying psychological principles and the different methods of advertising are studied, and each student prepares several advertisements of diverse forms. The strength of various appeals, the form of advertisements, the use of type and illustrations, and the various modes of advertising the drug store are discussed.

The work of the third year is planned to prepare the student to manage a drug store. The course is given from the point of view of the employer rather than that of the employee as in the two earlier years. The principal topics are starting a business, purchasing, and selling. Besides these, certain miscellaneous topics are considered, such as taxes, employees, banking relations, and insurance. The work is on a discussion basis. Lectures are informal, and all students are presumed to have had drug store experience from which angle they can intelligently discuss the problems presented. The best thought of experts on these subjects is compared with the student's own experience, in order that he may see its relation to the work of conducting a store.

The question of competition and the factors affecting the location of a store are considered. The relative advantages of individual ownership, partnerships, and corporations are considered, together with the method of forming a corporation. Then general consideration of fixtures, lighting, and preparation for the opening follow. Some general considerations of finance and some of the pitfalls in buying an established business are discussed.

The subtopics under purchasing include the establishment of credit, general considerations, records, receiving and checking goods, turnover, stock records, and inventories, both perpetual and stock. Under selling are considered marking goods and the effect of various selling policies, methods of increasing sales, including sales letters, collections, and attitude toward the public, also relations with other pharmacists and other business men.

While it is not felt that the subject is fully developed yet, enough has been done with it to justify the belief that it is now placed where it belongs in the course, and that it will ultimately take its place among the most useful subjects taught in colleges of pharmacy.

DR. W. T. SANGER ELECTED PRESIDENT OF MEDICAL COLLEGE OF VIRGINIA.

Dr. W. T. Sanger, one of the prominent young educators of the south, has been elected president of the Medical College of Virginia and will assume his duties July 1. He received his Ph.D. degree from the Clark University in 1915.

Dr. Sanger goes to the Medical College of Virginia from the Virginia state board of education where he has served as secretary for several years. He succeeds Dr. Stuart McGuire, whose duties as a surgeon make it impossible for him to give the Medical College of Virginia, as its president, the time necessary for the full development of that institution.

SEVENTH DISTRICT, NATIONAL ASSOCIATION OF BOARDS OF PHARMACY MEETING.

The boards of pharmacy of Georgia, Florida, Alabama, Mississippi and Louisiana, comprising the seventh district, held a meeting last month in Atlanta. Vice-President W. M. Hawkins, of Daytona, Fla., presided. Some of the problems to be considered at Des Moines were discussed. Secretary H. C. Christensen was present during the sessions.

THE COMMONWEALTH STUDY OF PHARMACEUTICAL EDUCATION.

BULLETIN NO. 6.

This is the sixth of a series of twelve monthly statements to be issued by the staff conducting this study.

Bulletin No. 5 carried, in response to a general request from publishers and readers of pharmaceutical journals, some results of the survey of nearly 1200 retail stores, which was conducted last summer. Now comes a request from textbook writers who are revising their textbooks.

The director of the study appreciates how valuable the results of this research will be to textbook writers and wishes to coöperate fully with any who care to take advantage of the findings. However, it is impossible to distribute any material at this time since nothing in the nature of finished reports has been reviewed and passed upon by the Advisory Committee. Since most of the studies are correlated they cannot be worked out independently and released for publication.

Following is a list of the headings under which the study is being conducted. Where assistance is being given by men outside the staff the names are given.

MIMEOGRAPHED COPIES OF THE FINAL REPORT ON EACH TOPIC WILL BE READY FOR DISTRIBUTION AT COST AFTER OCTOBER 1, 1925.

Pharmaceutical Jurisprudence—Dr. J. H. Beal, H. C. Christensen.

Pharmaceutical Traits and Ethics—Dr. W. W. Charters, Mrs. E. H. Kenagy.

Types of Ingredients in 16,000 prescriptions studied, known as "Type of Ingredient" study and discussed in Bulletin No. 3—Staff.

Nomenclature study was discussed in Bulletin No. 4. The Latin was worked by Prof. L. M. Monell and is now being reviewed by Dean H. C. Muldoon.

Arithmetic—Staff.

Dosage including Veterinary Dosage—Staff.

Toxicology

Physiology, Pharmacology, Active Constituents—These three studies are being worked together by Dr. A. R. Bliss, Jr. and when completed will be reviewed by Dr. Torald Sollmann.

Botany and Pharmacognosy including Geographical source, collection and preservation, adulteration and contamination. These studies are under the direction of Dean H. H. Rusby.

Physics and Chemistry are being studied under the direction of Dean Edward Kremers.

Bio-assaying—Dr. P. S. Pittenger is assisting in this study.

Bacteriology and Immunology—Staff.

Manufacturing—What should be manufactured by the pharmacist, has been determined by questionnaires sent to many teachers and pharmacists. The problems involved in manufacturing are being studied by Prof. E. Fullerton Cook.

Compounding and Dispensing—Compounding problems as drawn from 16,000 prescriptions studied. Study being conducted by Dr. Louis Saalbach.

Pharmaceutical English, History and Orientation being studied by Dr. W. W. Charters.

Public Health, Sanitation, Hygiene, First Aid, Clinical Work, study being made by U. S. Public Health Service.

Insecticides and Fungicides by U. S. Department of Agriculture.

Library (methods of stimulating use of) by the Staff.

When completed the report will show just what information the pharmacist needs on these various topics.

A CENSUS OF PHARMACEUTICAL RESEARCH.

BY H. V. ARNY.*

At the 1924 meeting of the National Conference of Pharmaceutical Research the Executive Committee of that organization was directed to take a census of pharmaceutical research. Accordingly a questionnaire was prepared for distribution asking for the following information.

1 and 2. Name and address of person filling out sheet.

3. Are you personally engaged in research work intended for publication?

4. If so, please give subject of your research.

5. Kindly mention names of persons under your supervision with subjects upon which they are working.

6. Kindly give names and addresses of persons not under your supervision whom you think should obtain this questionnaire.

7. Kindly mention topics of interest to you in your daily work upon which you think further research should be done.

This questionnaire was sent all delegates and committee members of the Research Conference; to the officers of the national associations affiliated with the Research Conference and to the deans of the schools belonging to the American Conference of Pharmaceutical Faculties as well as of the five New York colleges; to the members of the U. S. P. and N. F. revision committees; to the members of the Scientific Section of the American Drug Manufacturers' Association; and to the three pharmaceutical committees of the National Research Conference.

This list after elimination of duplicates numbered slightly over 100 names. Question No. 6 brought a number of responses and when the persons whose names were received returned the questionnaire sheets sent to them, they in turn suggested other persons to whom the questionnaire should be sent; so that in all, some 270 questionnaire sheets were sent out. By that time, the returns to Question No. 6 became so distinctly non-pharmaceutical, that the Census was brought to a close, since there was no desire to "pad" the Census with extraneous material.

The Census as presented on the pages which follow, records the names of 239 research workers who may be classified as follows:

Hospital pharmacists	3
Retail pharmacists	10
Pharmacists, engaged in medical school and chemical school work	16
Governmental scientists, doing pharmaceutical research	19
Non-pharmaceutical teachers and their students doing pharmaceutical research (chiefly on the synthesis of medicinal chemicals)	28
Manufacturing pharmacists	72
Pharmaceutical teachers and their students	91
TOTAL	239

A goodly company of seekers after truth, united in the bond of service for humanity; all striving for the relief of bodily ills.

---

* Chairman, National Conference on Pharmaceutical Research.

CENSUS OF PHARMACEUTICAL RESEARCH.

Index numbers intended to indicate coöperative work.

Index No.	*Name.*	*Laboratory.*	*Town.*	*Subject.*	*Remarks.*
1	Adams, Roger	Chemistry Bldg., University of Ill.	Urbana, Ill.	Chaulmoogra acids Arseno-organics Local anesthetics	
2	Allison, Catharine	Chemistry Bldg., University of Ill.	Urbana, Ill.	Silico-tungstic acid	See No. 11
3	Andrews, M. J.	College Pharmacy, Univ. of Maryland	Baltimore, Md.	P_H of compound tincture of gentian	See No. 133
4	Arny, H. V.	College Pharmacy, Columbia Univ.	New York, N. Y.	Colorimetric tests with standardized colored fluids Syrup of hydriodic acid and syrup of ferrous iodide	See Nos. 211 and 220
5	Balandra, F. J.	Massachusetts College of Pharmacy	Boston, Mass.	Quantitative microscopic analysis	See No. 236
6	Ballard, C. W.	College Pharmacy, Columbia Univ.	New York, N. Y.	Pharmacognosy of the genus Erythroxylon	
7	Barol, A.	H. K. Mulford Co.	Philadelphia, Pa.	Silver protein compounds	
8	Base, Daniel	Hynson, Westcott & Dunning	Baltimore, Md.	See Dunning	
9	Bateman, Miss D.	Chemistry Bldg., Univ. of Illinois	Urbana, Ill.	Pressor Anesthetics	See No. 151
10	Beaber, N. J.	Chem. Laboratory, Iowa State College	Ames, Iowa	Local Anesthetics	See No. 73
11	Beal, G. D.	Chemistry Bldg., Univ. of Illinois	Urbana, Ill.	Alkaloidal analytic methods Emodin drugs Unsaturated fatty acids Silico-tungstic acid	See Nos. 2, 21, 41, 87, 125, 154, 186 and 215
12	Bebie, Jules	Monsanto Chem. Works	St. Louis, Mo.	Caffeine citrate	
13	Beringer, G. M.	Retail Pharmacy	Camden, N. J.	U. S. P. and N. F. revision problems	
14	Billing, W. M.	W. S. Merrell Co.	Cincinnati, O.	Isoelectric point of tissue fibrinogen	See Nos. 31, 62, 70, 83 and 165
15	Bird, Edwin	LaWall Laboratory	Philadelphia, Pa.	Lead in zinc oxide	See No. 140
16	Bliss, A. R.	Medical College., Univ. Tenn.	Memphis, Tenn.	Pharmacologic studies	See Nos. 22, 115 and 224
17	Bogert, M. T.	Havemeyer Lab., Columbia Univ.	New York, N. Y.	Synthesis of medicinal chemicals	
18	Bonisteel, W. J.	College Pharmacy, Columbia Univ.	New York, N. Y.	Columbian cinchonas	
19	Bowman, H. E.	Mass. College Pharmacy	Boston, Mass.	Effect of pasteurizing machines on dairy products	See No. 236
20	Bradley, T. J.	Mass. College Pharmacy	Boston, Mass.	U. S. P. revision problems	
21	Bramlet, H. B.	Chemistry Bldg., University of Ill.	Urbana, Ill.	Silico-tungstic acid	See No. 11
22	Brown, M. F.	Medical College, Univ. Tenn.	Memphis, Tenn.	Pharmacology of Western oil of chenopodium	See No. 16
23	Browne, C. A.	Bureau of Chemistry	Washington, D. C.	Chemical, biological and pharmacological research	See Nos. 28, 35, 38, 60, 150, 158, 161, 191, 194, 227 and 228
24	Brunner, H.	Lehn & Fink	Bloomfield, N. J.	Synthesis of thymol	See No. 50
25	Bugbee, E. P.	Parke, Davis & Co.	Detroit, Mich.	Biological standardization of glandular products	See No. 213
26	Burlage, H. N.	College Pharmacy, Univ. Washington	Seattle, Wash.	Commercial production of benzaldehyde	See No. 147
27	Bye, Mortimer	Frederick Stearns & Co.	Detroit, Mich.	Benzyl compounds Insulin	See Nos. 171, 184 and 202
28	Capen, Ruth G.	Bureau of Chemistry	Washington, D. C.	Moisture in crude drugs	See No. 38
29	Case, F. H.	Sterling, Laboratory, Yale University	New Haven, Conn.	Local anesthetics	See No. 104

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
30	Caspe, Sol.	H. A. Metz & Co.	New York, N. Y.	See Dubin	
31	Catherman, R. F.	W. S. Merrell Co.	Cincinnati, O.	Biochemical products	See No. 14
32	Cawley, Ellen	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Digitalis	See No. 221
33	Chase, Marcus	College Pharmacy, S. D. State College	Brookings, S. D.	Grindelia squarrosa	
34	Cheng, P. V.	College Pharmacy, Univ. Washington	Seattle, Wash.	Pacific coast drug plants	See No. 147
35	Chesnut, V. H.	Bureau of Chemistry	Washington, D. C.	Chemistry of the cotton plant	See No. 172
36	Christensen, B. V.	College Pharmacy, Univ. Wisconsin	Madison, Wis.	Chemistry of hyoscyamus	See No. 134
37	Cleveland, T. K.	Sterling Laboratory, Yale Univ.	New Haven, Conn.	Hypnotics	See No. 104
38	Clevenger, J. F.	Bureau of Chemistry	Washington, D. C.	Cactus grandiflorus Melting points Moisture in crude drugs	See No. 28
39	Coghill, Robert	Sterling Laboratory, Yale University	New Haven, Conn.	Chemistry of Tubercle bacilli	See No. 122
40	Cole, Irvin	H. A. Metz & Co.	New York, N. Y.	See Dubin	
41	Coleman, G. H.	Chem. Bldg., Univ. of Illinois	Urbana, Ill.	Silico-tungstic acid	See No. 11
42	Cook, E. F.	Philadelphia College Pharm. and Sc.	Philadelphia, Pa.	U. S. P. & N. F. revision problems	
43	Cox, Mildred	Sterling Laboratory, Yale University	New Haven, Conn.	Local anesthetics of the holocaine type	See No. 104
44	Corbett, H. B.	H. A. Metz & Co.	New York, N. Y.	See Dubin	
45	Cortland, George	Upjohn Co.	Kalamazoo, Mich.	Ovarian constituents	See No. 103
46	Crockett, W. G.	Medical College of Va.	Richmond, Va.	Rate of decomposition of ethyl nitrate in copaiba mixtures Use of isopropyl alcohol in spirit of nitrous ether	
47	Culley, John	Retail Pharmacy	Ogden, Utah.	U. S. P. revision problems	
48	Cusick, W. P.	College Pharmacy, Univ. Michigan	Ann Arbor, Mich.	Assay of sulphur ointment	See No. 75
49	Diner, Jacob	College Pharmacy, Fordham Univ.	New York, N. Y.	Action of pancreatin on normal and diabetic animals	
50	Dittmar, M.	Lehn & Fink	Bloomfield, N. J.	General research problems	See Nos. 24, 138, 180, 196, 206, 217 and 232
51	Dixon, H. C.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Digitalis	See No. 221
52	Dohme, A. R. L.	Sharp & Dohme	Baltimore, Md.	U. S. P. revision problems	
53	Dorjahn, J. A.	College Pharmacy, Univ. of Illinois	Chicago, Ill.	Tragacanth evaluation	See No. 71 and 234
54	Dox, A. W.	Parke, Davis & Co.	Detroit, Mich.	Synthetic hypnotics	See No. 213
55	Downie, R. R.	College Pharmacy, Univ. of Wisconsin	Madison, Wis.	U. S. P. peppermint problems	See No. 134
56	Dubin, H. E.	H. A. Metz & Co.	New York, N. Y.	Active principles of cod liver oil Synthetic odd-carbon fats in diabetes Synthetic suprareum Insulin	See Nos. 30, 40 and 44
57	DuMez, A. G.	Hygienic Laboratory	Washington, D. C.	Studies in drug addiction U. S. P. revision problems	
58	Dunning, H. A. B.	Hynson, Westcott, & Dunning	Baltimore, Md.	Dyes, Sulphonphthalein compounds, heparin, ovarian products, stibno-organics mercuro-organis	See Nos. 8 and 230
59	Eldridge, R. W.	Sterling Chem. Lab., Yale Univ.	New Haven, Conn.	Local anesthetics Iodine compounds	See No. 104
60	Emery, W. O.	Bureau of Chemistry	Washington, D. C.	Vitamin picrates from yeast Chlorination products of antipyrine	See No. 23

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
61	Engelhardt, Herman	Sharp & Dohme	Baltimore, Md.	N. F. Revision problems	
62	Ewe, George	Wm. S. Merrell Co.	Cincinnati, O.	Research in pharmaceutical products	See No. 14
63	Fanslau, C. E.	N. J. College Pharm.	Newark, N. J.	Preservation of solution of Magnesium Citrate	See No. 65
64	Farwell, O. A.	Parke, Davis & Co.	Detroit, Mich.	Histology of medicinal drugs Local flora of Michigan	See No. 213
65	Fischelis, R. P.	N. J. College Pharm.	Newark, N. J.	Recipe Book problems Preservation of Solution of Magnesium Citrate	See No. 63
66	Fischer, E. B.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Volatile oil yield from plants grown at Univ. Minn. Assay of Minnesota digitalis and other varieties	See Nos. 159 and 235
67	Fisk, F. B.	Pitman, Moore Co.	Indianapolis, Ind.	Antiseptic value of different dyes	
68	Fullerton, Bryant	Upjohn Co.	Kalamazoo, Mich.	Ovarian constituents	See No. 103
69	Gaston, Dorothy	College Pharmacy, Univ. Washington	Seattle, Wash	Relaxing properties of aromatic esters	See No. 147
70	Gates, Miss E.	Wm. S. Merrell Co.	Cincinnati, O.	Research in pharmaceutical products	See No. 14
71	Gathercoal, E. N.	College Pharmacy, Univ. of Illinois	Chicago, Ill.	Quantitative determination of vegetable powders Cascara	See Nos. 53 and 234
72	Gilfillan, F. A.	School of Pharm., State College	Corvallis, Oregon	Catalytic dehydration and hydrogenation of organic compounds	See No. 111
73	Gilman, Henry	Dept. Chem., Iowa State Coll.	Ames, Iowa	Local anesthetics Antiseptics	See Nos. 10 and 100
74	Githens, T. S.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Digitalis	See No. 221
75	Glover, C. C.	College Pharmacy, Univ. Michigan	Ann Arbor, Mich.	General pharmaceutical research	See Nos. 48, 98, 99 and 208
76	Glycart, C. K.	U. S. Food & Drug Laboratory	Chicago, Ill.	Arsenicals Alkaloidal assays	
77	Goeckel, H. J.	Private Laboratory	Cranford, N. J.	Chemico-pathological and biological research	
78	Goeckel, Leah	Private Laboratory	Cranford, N. J.	Chemico-pathological and biological research	
79	Goodrich, F. J.	College Pharmacy, Univ. Washington	Seattle, Wash.	Hypnotics of the urethane type	See No. 147
80	Gordon, S. M.	Course in Pharm., Univ. Wisconsin	Madison, Wisconsin	Biochemistry of the mints	See No. 134
81	Graber, H. T.	Digestive Ferments Co.	Detroit, Mich.	Endocrine constituents	
82	Grafflin, Margaret	Sterling Laboratory, Yale Univ.	New Haven, Conn.	Antiseptics	See No. 122
83	Grant, E. H.	W. S. Merrell Co.	Cincinnati, O.	Pharmaceutical products	See No. 14
84	Gray, William	Presbyterian Hospital	Chicago, Ill.	Recipe Book problems	
85	Griffith, Morris	Stetson Hospital	Philadelphia, Pa.	See I. Griffith	
86	Griffith, Ivor	Stetson Hospital	Philadelphia, Pa.	Substitutes for ethanol as drug solvents Soluble carbohydrates as accessory solvents	
87	Haas, E. S.	Chem. Bldg., Univ. Illinois	Urbana, Ill.	Silicotungstic Acid	See No. 11
88	Hall, W. A.	Retail Pharmacy	Detroit, Mich.	Spirit of Nitrous Ether Infusion of Digitalis	
89	Hamilton, H. C.	Parke, Davis & Co.	Detroit, Mich.	Digitalis	See No. 213
90	Handy, J. A.	Larkin Co. Inc.	Buffalo, N. Y.	Diethylphthalate	See No. 116

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
91	Hansen, L.	Sterling Laboratory, Yale University	New Haven, Conn.	Ethylamine derivatives	See No. 104
92	Harrison, C. W.	U. S. Food and Drug Laboratory	Chicago, Ill.	Acetylsalicylic acid	
93	Harrisson, J. W. E.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Isopropyl alcohol Orange juice	See No. 140
94	Hart, Fanchon	College Pharmacy, Columbia Univ.	New York, N. Y.	Microscopy of official herbs and their substitutes Micro-assay methods	
95	Hart, M. C.	Upjohn Co.	Kalamazoo, Mich.	Ovarian constituents	See No. 103
96	Havenhill, L. D.	College Pharmacy, Univ. Kansas	Lawrence, Kansas	Kansas podophyllum	
97	Hay, Marjory	College Pharmacy, Univ. Washington	Seattle, Wash.	Bibliography of local anesthetics	See No. 147
98	Hayman, J. L.	College Pharmacy, Univ. Michigan	Ann Arbor, Mich.	Physical constants of acetylsalicylic acid	See No. 75
99	Heard, J. T.	College Pharmacy, Univ. Michigan	Ann Arbor, Mich.	Preservation of certain U. S. P. preparations	See No. 75
100	Hechert, L. C.	Dept. Chem., Iowa State Coll.	Ames, Iowa	Local anesthetics and antiseptics	See No. 73
101	Hettler, Donald	Sterling Laboratory, Yale University	New Haven, Conn.	Chemistry of Tubercle bacilli	See No. 122
102	Hewitt, H. G.	Course in Pharmacy, Univ. Wisconsin	Madison, Wis.	Life history of Monarda fistulosa	See No. 134
103	Heyl, F. W.	Upjohn Co.	Kalamazoo, Mich.	Constituents of Corpus lutem, ovarian residues and follicular fluid	See Nos. 45, 68, 95 and 164
104	Hill, A. J.	Sterling Laboratory, Yale University	New Haven, Conn.	Local anesthetics	See Nos. 29, 37, 43, 59, 91, 126, 141, 209, 229
105	Hilton, S. L.	Retail Pharmacy	Washington, D. C.	U. S. P. & N. F. problems	
106	Hjort, A. M.	Parke, Davis & Co.	Detroit, Mich.	Calcium metabolism	See No. 213
107	Hoch, J. H.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Digitalis	See No. 221
108	Hochstetler, R. W.	Parke, Davis & Co.	Detroit, Mich.	Physiologic assay methods Pharmacologic problems	See Nos. 181 and 213
109	Hogstad, Anton	Coll. Pharm., South Dakota State Coll.	Brookings, S. D.	Chenopodium and its oil	
110	Holmes, A. D.	E. L. Patch Co.	Boston, Mass.	Vitamin potency of cod liver oil	See Nos. 168 and 231
111	Hopkins, L. B.	Coll. Pharm., Oregon State College	Corvallis, Oregon	Poisonous mushrooms of the Willamet Valley	See No. 72
112	Horn, Millard	Dept. Chem., Univ. Maryland	College Park, Md.	Organo metallic compounds	See Kharasch
113	Houseman, P. A.	MacAndrews and Forbes Co.	Camden, N. J.	Constituents of licorice root	See No. 210
114	Howard, J. W.	Dept. Chem., Univ. Montana	Missoula, Mont.	Studies of antiseptic action of isopropyl alcohol and its trichloro derivative	See No. 207
115	Howze, H. H.	Medical Coll., Univ. Tenn.	Memphis, Tenn.	Vegetable cathartics	See No. 16
116	Hoyt, L. F.	Larkin Co., Inc.	Buffalo, N. Y.	Diethylphthalate	See No. 90
117	Hunt, Reid	Medical School, Harvard Univ.	Boston, Mass.	Standardization of thyroid	
118	Hyde, E. K.	Mentholatum Co.	Buffalo, N. Y.	Production of menthol from American peppermint oil	
119	Isbel, Horace	Dept. Chem., Univ. Maryland	College Park, Md.	Chemo-therapy of tuberculosis	See No. 128
120	Jenison, J. C.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Biochemistry of mints	See No. 134
121	Jenkins, G. L.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Chemistry of Datura Stramonium	See No. 134
122	Johnson, Treat B.	Sterling Chem. Lab., Yale University	New Haven, Conn.	Antiseptics Tubercle bacilli	See Nos. 39, 82, 101 and 176
123	Jordan, C. B.	College Pharmacy, Purdue Univ.	Lafayette, Ind.	Toxic ingredient of white snakeroot Gelatin as an emulsifier	See Nos. 130, 195 and 238

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
124	Kamm, Oliver	Parke, Davis & Co.	Detroit, Mich.	Pharmacology of pituitrin and of benzyl alcohol	See Nos. 106, 149 and 213
125	Katti, M. C. T.	Dept. Chem., Univ. Illinois	Urbana, Ill.	Assay of emodin	See No. 11
126	Keach, D. F.	Sterling Chem. Lab., Yale University	New Haven, Conn.	Hypnotics	See No. 104
127	Kelly, E. F.	College Pharmacy, Univ. Maryland	Baltimore, Md.	U. S. P. revision problems	
128	Kharasch, M. S.	Dept. Chem., Univ. Maryland	College Park, Md.	Chemo-therapy	See Nos. 112 and 119
129	Kilmer, F. B.	Johnson & Johnson	New Brunswick, N. J.	The mydriatic solanums	
130	Klemme, C. J.	College Pharmacy, Purdue Univ.	Lafayette, Ind.	Toxic ingredients of white snakeroot	See No. 123
131	Klemme, Mrs. M. S.	Dept. Chem., Univ. Colorado	Boulder, Col.	Nitration products of piperonal Mother substance of camphor	
132	Koch, J. A.	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Syntheses with dichlorodiethyl ether	See No. 170
133	Krantz, J. C.	College Pharmacy, Univ. Maryland	Baltimore, Md	Hydrogen-ion concentration and alkaloidal assays Effect of p_H on emulsification Preservation of Dakin's solution Stability of compound tincture of gentian	See No. 3
134	Kremers, Edward	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Phytochemical research	See Nos. 36, 55, 80, 102, 120, 121, 135, 155, 173, 190, 216 and 219
135	Kuester, H. L.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	U. S. P. podophyllum problems	See No. 134
136	Langenhan, H. A.	College Pharmacy, Univ. Washington	Seattle, Wash.	Acetylsalicylic acid	See No. 199
137	Lanwermeyer, C. F.	Milliken & Co.	St. Louis, Mo.	See Ruddiman	
138	Laschinger, H.	Lehn & Fink	Bloomfield, N. J.	Assay of synthetic camphor	See No. 50
139	Lascoff, J. L.	Retail Pharmacy	New York, N. Y.	Recipe Book problems	
140	LaWall, C. H.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Commercial dextrin	See Nos. 15 and 93
141	Lazzell, C. R.	Sterling Chem. Lab., Yale University	New Haven, Conn.	Local anesthetics	See No. 104
142	LeBlanc, Floyd	School Pharm., S. D. State College	Brookings, S. D.	Alkaloidal assays Elimination of chlorophyll from alkaloidal extracts	
143	Lemon, A. B.	College Pharmacy, Univ. Buffalo	Buffalo, N. Y.	The Commonwealth study of pharmacy	See No. 156
144	Lichtenberg, H. C.	Mentholatum Co.	Buffalo, N. Y.	Menthol	
145	Lloyd, J. U.	Lloyd Bros.	Cincinnati, O.	Phytochemical problems Adsorption problems in pharmacy	
146	Lofgren, F. V.	College Pharmacy, Univ. Washington	Seattle, Wash.	Local anesthetics of the amine type	See No. 147
147	Lynn, E. V.	College Pharmacy, Univ. Washington	Seattle, Wash.	Oxygenation by use of nitrosyl chloride	See Nos. 26, 34, 69, 79, 97, 146, 177 and 239
148	Lyons, A. B.	Nelson Baker & Co.	Detroit, Mich.	U. S. P. revision problems	
149	Lyons, Edward	Parke, Davis & Co.	Detroit, Mich.	Mercurials	See No. 213
150	Marciniak, E. S.	Bureau of Chemistry	Washington, D. C.	Bio-assays and other pharmacologic problems	See No. 23
151	Marvel, C. S.	Dept. Chem., Univ. Illinois	Urbana, Ill.	Mercurated dyes Pressor anesthetics	See Nos. 9 and 203

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
152	Masucci, Peter	H. K. Mulford Co.	Philadelphia, Pa.	Toxicity of iron cacodylate Antiseptic power of silver salts	See Nos. 169 and 197
153	Mayer, J. L.	Liggett Laboratory	New York, N. Y.	Problems in the analytical chemistry of the U. S. P.	
154	McGregor, R. R.	Dept. Chem., Univ. Illinois	Urbana, Ill.	Unsaturated fatty acids	See No. 11
155	Miller, L. P.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Chemistry of Cnicus benedictus	See No. 134
156	Monell, L. M.	College Puarmacy, Univ. Buffalo	Buffalo, N. Y.	The Commonwealth study of pharmacy	See Nos. 143, 185 and 226
157	Moraw, H. O.	U. S. Food & Drug Laboratory	Chicago, Ill.	Assay of chloroform and chloral hydrate in pharmaceuticals	
158	Munch, J. C.	Bureau of Chemistry	Washington, D. C.	Bio-assays and other pharmacologic problems	See No. 23
159	Newcomb, E. L.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Minnesota digitalis Cultivation of Cactus grandiflorus and of aspidium	
160	Nitardy, F. W.	E. R. Squibb & Sons	New York, N. Y.	U. S. P. revision problems	
161	Palkin, Samuel	Bureau of Chemistry	Washington, D. C.	The spectroscope in drug chemistry Alkaloidal assay methods Automatic extraction devices Identification and assay of synthetics	See Nos. 23, 227 and 228
162	Paul, A. E.	U. S. Food & Drug Laboratory	Chicago, Ill.	Camphor and monobromated camphor	
163	Pauley, A. W.	St. Louis College of Pharmacy	St. Louis, Mo.	Survey of drug store conditions	
164	Payne, Wilbur	Upjohn Co.	Kalamazoo, Mich.	Biological study of ovarian constituents	See No. 103
165	Perkins, A. T.	E. S. Merrell Co.	Cincinnati, O.	Bio-chemical problems	See No. 14
166	Perkins, G. W.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Digitalis	See No. 221
167	Pfeifle, H. W.	Parke, Davis & Co.	Detroit, Mich.	Physiologic assay methods Pharmacologic problems	See Nos. 181 and 213
168	Piggott, Madeleine, G.	E. L. Patch Co.	Boston, Mass.	Vitamin potency of cod liver oil	See No. 110
169	Pittenger, P. A.	H. K. Mulford Co.	Philadelphia, Pa.	Standardization of glandular products Pituitary assay methods Stability of infusion of digitalis Deterioration of glandular preparations	See Nos. 152 and 197
170	Pittenger, Wm.	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Synthesis of dichloro-diethyl-ether	See No. 132
171	Pitz, Walter	Frederick Stearns & Co.	Detroit, Mich.	Insulin	See No. 27
172	Power, F. B.	Bureau of Chemistry	Washington, D. C.	Chemical investigation of the cotton plant	See No. 35
173	Rang, K. H.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Life history of Monarda punctata	See No. 134
174	Raubenheimer, H. C.	Retail Pharmacy	Brooklyn, N. Y.	Prescription problems	
175	Raubenheimer, Otto	Retail Pharmacy	Brooklyn, N. Y.	Galenicals Historical pharmacy	
176	Renfrew, Alice	Sterling Chem. Lab., Yale University	New Haven, Conn.	Antiseptic combinations	See No. 122
177	Rhodes, Leonard	College Pharmacy, Univ. Washington	Seattle, Wash.	Analysis of coffee	See No. 147
178	Rogers, C. H.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Colorimetric assay of vanillin Alkaloidal qualitative sep.	See No. 235

Index No.	*Name.*	*Laboratory.*	*Town.*	*Subject.*	*Remarks.*
179	Rosin, Joseph	Powers - Weightman Rosengarten Co.	Philadelphia, Pa.	U. S. P. organic chemicals	
180	Ross, V.	Lehn & Fink	Bloomfield, N. J.	Isolation of the toxin of Pneumococcus	See No. 50
181	Rowe, L. W.	Parke, Davis & Co.	Detroit, Mich.	Physiologic assay methods Pharmacologic problems	See Nos. 108, 167 and 213
182	Ruddiman, E. A.	J. T. Milliken Co.	St. Louis, Mo.	Toxicity of mixtures of quinine and aspirin	See No. 137
183	Rusby, H. H.	College Pharmacy, Columbia Univ.	New York, N. Y.	Medical flora of South America	
184	Russell, Jason	Frederick Stearns & Co.	Detroit, Mich.	Insulin Benzyl compounds	See No. 27
185	Saalbach, Louis	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Commonwealth study of Pharmacy	See No. 156
186	Salzberg, H. L.	Dept. Chem., Univ. Illinois	Urbana, Ill.	Silicotungstic acid	See No. 11
187	Sayre, L. E.	College Pharmacy, Univ. Kansas	Lawrence, Kansas	Extraction of theobromine from cacao	See No. 205
188	Schaefer, H. H.	College Pharmacy, Columbia Univ.	New York, N. Y.	Composition of shellac Stability of spirit of nitrous ether	
189	Schneider, Albert	School Pharmacy, North Pacific College	Portland, Oregon	Calcium compounds and sodium cinnamate in tuberculosis Cancer research Micro-analytic methods in forensic medicine	
190	Schulz, E. R.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Chemistry of Berberis vulgaris	See No. 134
191	Schwartze, E. W	Bureau of Chemistry	Washington, D. C.	Bio-assays and other pharmacologic problems	See No. 23
192	Scoville, W. L.	Parke, Davis & Co.	Detroit, Mich.	Cause of precipitation in tincture and fluidextracts	See No. 213
193	Selzer, L. A.	Retail Pharmacy	Detroit, Mich.	U. S. P. & N. F. revision problems	
194	Shepherd, Miss C. M.	Bureau of Chemistry	Washington, D. C.	Bio-assays and other pharmacologic problems	See No. 23
195	Shireman, Miss A. F.	College Pharmacy, Purdue University	Lafayette, Ind.	Assay of phosphates	See No. 123
196	Shternov, V	Lehn & Fink	Bloomfield, N. J.	Therapeutic value of various varieties of aconite root	See No. 50
197	Slothower, G. B.	H. K. Mulford Co.	Philadelphia, Pa.	Microcrystalline detection of endocrine extracts Toxicity of iron cacodylate	See Nos. 152 and 169
198	Smyithe, E. E.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Preparation of herbarium material	See No. 235
199	Snidow, Harriet V.	College Pharmacy, Univ. Washington	Seattle, Wash.	Pharmaceutical study of acetyl salicylic acid	See No. 136
200	Snow, C. M.	College Pharmacy, Univ. Illinois	Chicago, Ill.	U. S. P. & N. F. revision problems	
201	Snyder, J. P.	Norwich Pharmacal Co.	Norwich, N. Y.	Analytic standards for hypodermic tablets	
202	Sowary, Carl	Frederick Stearns & Co.	Detroit, Mich.	Insulin Benzyl compounds	See No. 27
203	Spencer, V. E.	Dept. Chem., Univ. Illinois	Urbana, Ill.	Mercurated dyes	See No. 151
204	Spevakov, N.	Digestive Ferments Co.	Detroit, Mich.	See Graber	
205	Sterling, Chas.	College Pharmacy, Univ. Kansas	Lawrence, Kansas	U. S. P. microscopic problems	See No. 187
206	Stern, J. T.	Lehn & Fink	Bloomfield, N. J.	See Ulrich	See No. 50
207	Stimpert, F. D.	Dept. Chem., Univ. Montana	Missoula, Mont.	See Howard	
208	Stocking, C. H.	College Pharmacy, Univ. Michigan	Ann Arbor, Mich.	Effect of formaldehyde on the refractive index of milk serum	See No. 75

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
209	Sumpter, W. C.	Sterling Chem. Lab., Yale University	New Haven, Conn.	Local anesthetics	See No. 104
210	Swift, C. K.	MacAndrews & Forbes Co.	Camden, N. J.	Constituents of licorice root	See No. 113
211	Taub, Abraham	College Pharmacy, Columbia Univ.	New York, N. Y.	Comparison of standards in colorimetric p_H determinations	See No. 4
212	Taub, Harry	College Pharmacy, Columbia Univ.	New York, N. Y.	Quantitative microscopic methods	
213	Taylor, F. O.	Parke, Davis & Co.	Detroit, Mich.	Biological, chemical and pharmaceutical research	See Nos. 25, 54, 64, 89, 106, 108, 124, 149, 167, 181 and 192
214	Thayer, F. K.	Abbott Laboratories	Chicago, Ill.	Problems in synthetic chemistry. See No. 223	See No. 11
215	Tschentke, H. L.	Dept. Chem., Univ. Illinois	Urbana, Ill.	Emodin glucosides	See No. 11
216	Uhl, A. H.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	U. S. P. turpentine problems	See No. 134
217	Ulrich, J. L.	Lehn & Fink	Bloomfield, N. J.	Action of potassium chlorate on hemoglobin Iso-electric point of protein in saliva Rate of diffusion of salts into protein Determination of alkali in saliva and in protein solutions	See Nos. 50 and 206 See No. 134
218	Utech, P. H.	Retail Pharmacy	Meadville, Pa.	N. F. revision problems	
219	Valenzuela, P.	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Chemistry of Philippine ginger	See No. 4
220	Vener, Benjamin	College Pharmacy, Columbia Univ.	New York, N. Y.	Syrup of Ferrous Iodide Syrup of Hydriodic Acid	See Nos. 32, 51, 74, 107 and 166
221	Viehoever, Arno	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Micro-analysis Digitalis Domestic sources of santonin	See No. 223
222	Vliet, E. B.	Abbott Laboratories	Chicago, Ill.	Problems in synthetic chemistry	See No. 222
223	Volweiler, E. H.	Abbott Laboratories	Chicago, Ill.	Problems in synthetic chemistry	See No. 16
224	Waddell, Pearl	Med. Coll., Univ. Tennessee	Memphis, Tenn.	Relative toxicity of certain poisons on vomiting and non-vomiting animals	
225	Wagener, L. R.	Coll. Pharm., Univ. Michigan	Ann Arbor, Mich.	Electrometric alkaloidal titration	See No. 156
226	Wakeman, Nellie	Course in Pharm., Univ. Wisconsin	Madison, Wis.	Commonwealth study of Pharmacy	See Nos. 23 and 161
227	Wales, H.	Bureau of Chemistry	Washington, D. C.	Use of spectroscope in drug chemistry	See Nos. 23 and 161
228	Watkins, H. R.	Bureau of Chemistry	Washington, D. C.	Alkaloidal assay methods Automatic extraction devices	 See No. 104
229	Watts, Ruth	Sterling Chem. Lab., Yale University	New Haven, Conn.	Hydroxyacetanilids	See No. 58
230	White, E. C.	Hynson, Westcott & Dunning	Baltimore, Md.	Substances suitable for liver functionation tests Organic mercurials	See No. 110
231	Wilkins, Richards	E. L. Patch & Co.	Boston, Mass.	Vitamine potency of cod liver oil	See No. 50
232	Willgerodt, Miss T.	Lehn & Fink	Bloomfield, N. J.	Stability of pepsin preparations	See No. 236
233	Wilson, P. E.	Mass. Coll. Pharm.	Boston, Mass.	Structure and filicin content of American aspidium Tragacanth evaluation	See No. 71
234	Wirth, E. H.	College Pharmacy, Univ. Illinois	Chicago, Ill.	Assay of manna Location of the alkaloid in physostigma	 See Nos. 66, 159, 178 and 198
235	Wulling, F. J.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Pharmaceutical and botanical research problems	

Index No.	*Name.*	*Laboratory.*	*Town.*	*Subject.*	*Remarks.*
236	Youngken, H. W.	Massachusetts College Pharmacy	Boston, Mass.	Morphology of Aconite species Viburnum nudum as adulterant of V. prunifolium. Commercial sources of crude drugs	See Nos. 5, 19 and 233
237	Zeigler, W. H.	Pharm. Dept., Med. Coll., S. C.	Charleston, S. C.	Action of intraperitoneal injections of certain drugs	
238	Zufall, C. J.	College Pharmacy, Purdue Univ.	Lafayette, Ind.	Constituents of Verbena hastata Variation in constituents of Grindelia	See No. 123
239	Zumwalt, H. O.	College Pharmacy, Univ. Washington	Seattle, Wash.	Determination of alcohol in pharmaceuticals	See No. 147

This Census, although gratifying, is by no means complete. Several deans of pharmacy schools and several heads of the research departments of great manufacturing plants failed to respond and information concerning these had to be obtained indirectly. The list is, however, typical and fairly comprehensive, ranging from the standpoint of facilities from great university laboratories costing millions, to the simple dispensing room of a retail pharmacy (such as used in the past by Scheele, Sertürner and Procter) and from the standpoint of types from organic syntheses to statistical research such as the great work now being performed for pharmacy by the Commonwealth Foundation. Of notable service, fairly wrung by the writer out of modest workers is the research performed as a matter of duty by the members of the committees preparing the United States Pharmacopœia, the National Formulary and the A. Ph. A. Recipe Book.

An interesting outcome of the Census was the variety of topics suggested for research brought out by question No. 7. This will be the subject of a separate paper.

In conclusion, the Census answers unequivocally the questions whether there is such a thing as pharmaceutical research and whether such type of research is being done. That pharmaceutical research is an attractive field is shown by the great work being done by non-pharmacists in the preparation of medicinal chemicals; that pharmaceutically trained persons are available is shown by the record of 91 pharmaceutical teachers and their students and 72 manufacturing pharmacists now actually performing research work.

It is expected that a Census of Pharmaceutical Research will become an annual duty of the Research Conference and that future returns will be even more comprehensive than the one tabulated above.

Following in the footsteps of her parents, **Miss I. Curie** has earned the degree of Doctor of Sciences, her thesis being on "Researches on the Alpha Rays of Polonium, Oscillation Rate of Emission and Ionizing Power."

Prof. A. E. Goris succeeds Prof. Grimbert as chief pharmacist at the Central Pharmacy of the Paris hospitals. The latter has attained the age limit and retires for that reason.

Pharmacist **Virgillio Lucas** was recently awarded the Cezar Diogo Prize, and he has handed over the value of this to the Brazilian Association of Pharmacists to be invested as a fund out of which a gold medal is to be awarded every two years for the best work published on Analytical Chemistry as Applied to Pharmacy.

COMMITTEE REPORTS

NATIONAL COMMITTEE ON THE PHARMACEUTICAL SYLLABUS.

BULLETIN XXXV.

Chicago, Illinois, August 14, 1924.

FINANCIAL STATEMENT.

Since it is customary to report on the year's business at the annual convention of the A. PH. A. the following statement is presented:

Receipts.

1923.			
August 22	Cash on hand	$ 6.21	
October 11	American Conference Pharmaceutical Faculties	25.00	
October 22	American Pharmaceutical Association	25.00	
November 6	National Association Boards of Pharmacy	25.00	
1924.			
August 14	Received for 35 copies of "Syllabus"	66.90	
			$148.11

Disbursements.

1923.			
August 30	Exchange	.20	
October 11	Postage stamps	3.00	
October 17	State Street Trust Co., Boston, Mass. on account of note	18.76	
December 1	Exchange	.15	
1924.			
March 7	T. J. Bradley, postage and copyright fee	9.03	
March 7	American Pharmaceutical Association, advertising	12.37	
June 18	Postage stamps	2.00	
June 23	State Street Trust Co., Boston, Mass., on account of note	100.60	
			$146.11
August 14	Cash on hand		$2.00

Copies of the "Syllabus" 508 to 1200 inclusive are stored in this office.

Respectively submitted,
CLYDE M. SNOW, *Acting Secretary-Treasurer.*

Boston, Massachusetts, October 1, 1924.

BULLETIN XXXVI.

MEMBERSHIP OF THE PHARMACEUTICAL SYLLABUS COMMITTEE. 1924–1925.

From American Pharmaceutical Association.

Terms expire.	
1925	W. H. Rudder, Salem, Indiana.
1926	E. L. Newcomb, 719 Sixth Avenue, S. E., Minneapolis, Minn.
1927	E. G. Eberle, 253 Bourse Building, Philadelphia, Pa.
1928	E. F. Kelly, Lombard & Green Streets, Baltimore, Md.
1929	G. M. Beringer, 501 Federal Street, Camden, N. J.
1930	H. H. Rusby, 115 West 68th Street, New York, N. Y.
1931	W. G. Gregory, 185 Parkside Avenue, Buffalo, N. Y.

From American Conference of Pharmaceutical Faculties.

1925 E. A. Ruddiman, 138 Jeffmore Road, Webster Groves, Mo.
1926 E. F. Cook, 145 North Tenth Street, Philadelphia, Pa.
1927 W. C. Anderson, 47 Brevoort Place, Brooklyn, N. Y.
1928 J. A. Koch, Bluff & Pride Streets, Pittsburgh, Pa.
1929 T. J. Bradley, 179 Longwood Avenue, Boston, Mass.
1930 F. J. Wulling, University of Minnesota, Minneapolis, Minn.
1931 J. G. Beard, Chapel Hill, North Carolina.

From National Association of Boards of Pharmacy.

1925 W. B. Scott, Oakdale, Louisiana.
1926 G. C. Diekman, 115 West 68th Street, New York, N. Y.
1927 S. A. Williams, Troy, Alabama.
1928 John Culley, 2479 Washington Avenue, Ogden, Utah.
1929 Mathias Noll, 605 Atchison Street, Atchison, Kansas.
1930 W. D. Jones, 1 East Bay Street, Jacksonville, Florida.
1931 Frank Schachleiter, P. O. Box 1133, Little Rock, Arkansas.

Boston, Massachusetts, April 15, 1925.

BULLETIN XXXVII.

Bulletins giving the present membership of the Committee and a financial statement are enclosed. The note to the State Street Trust Company, Boston, Massachusetts, has been reduced to $400.

The chief difficulty confronting the Committee is the financial one. The sources of income are from the sale of the "Syllabus" and contributions of twenty-five dollars a year from each of the three national organizations which appoint representatives to the Committee. The "Syllabus" is sold at $2.00 a copy, which is as much as could reasonably be charged for a book of its size, but it is of use to only the comparatively few members of college of pharmacy faculties and of the state boards of pharmacy. The sale is slow and the total number of copies sold is small, so that it takes several years to pay the cost for making an edition. This cost is almost entirely made up of the bill for printing and binding the book, with only slight additional expenses for supplies and postage.

The change from a two- to a three-year minimum course in pharmacy, and the expected early appearance of new editions of the "United States Pharmacopœia" and the "National Formulary" will make another revision of the "Syllabus" necessary before long, but this cannot be undertaken until the third edition is paid for. In the meantime, the Chairman proposes that some suggestions for the arrangement of the work of the present two-year course to cover three years be issued as a supplementary folder, to be inserted in the present edition.

In Bulletin XXXIII, which was sent to the Committee on March 20, 1923, the arrangement of subjects and hours for the minimum three-year course in pharmacy was discussed and comments were asked for. Some members of the Committee strongly objected to the acceptance of a minimum three-year course as adopted by the American Conference of Pharmaceutical Faculties, and it has been thought best to wait until the outcome of this controversy could be known, before going on with our work, as the Syllabus Committee has not been granted any authority to fix the length of a pharmacy course and for us to assume this authority would only add further complications to a difficult question.

The Conference has stood by the vote, taken in 1920, that all member colleges shall require a minimum three-year course of all students beginning their courses in 1925 and thereafter and there is need of a supplement to the "Syllabus," covering this new arrangement, to serve until a new edition is issued, as described above.

The stenographer's record of the 1920 meeting of the Conference, at which the required minimum three-year course, after 1925, was adopted, clearly shows that this action was taken in order to give more time to properly cover the subjects which we now attempt to cover in the two-year course. This intent is frequently forgotten and other ideas and motives have been injected into the question by different people.

It now seems to be generally accepted that the three-year minimum course leading to the degree of Graduate in Pharmacy shall be made up of not less than 750 hours of instruction for each school year, or a total of not less than 2250 hours in the three years, and the following arrangement of subjects and hours is submitted for comment and discussion. After this is considered it will be revised and again submitted to the Committee. If it is adopted, it will then be printed in leaflet form for insertion in the "Syllabus."

(To replace pages 14 and 15 of the third edition of the "Pharmaceutical Syllabus.")

A SUGGESTED ARRANGEMENT OF SUBJECTS AND HOURS FOR A

THREE-YEAR COURSE

LEADING TO THE DEGREE OF GRADUATE IN PHARMACY (PH.G.).

HOURS OF INSTRUCTION.

Branches.		1st year.	2nd year.	3rd year.	Total.
I	Materia medica	200	200	200	600
II	Chemistry	250	250	250	750
III	Pharmacy	300	300	300	900
		750	750	750	2250

ASSIGNMENT OF SUBJECTS BY YEARS AND HOURS.

BRANCH I—MATERIA MEDICA.

	1st year.	2nd year.	3rd year.	Total.
Pharmaceutical botany	150	...	...	150
Physiology	50	...	...	50
General principles of materia medica	...	25	...	25
Posology and toxicology	...	25	25	50
Pharmaco- and therapy-dynamics	...	50	50	100
Pharmacognosy	...	100	125	225
	200	200	200	600

BRANCH II—CHEMISTRY.

	1st year.	2nd year.	3rd year.	Total.
Elementary physics	50	...	...	50
General inorganic chemistry	100	100	...	200
Qualitative analysis	100	50	...	150
Manufacturing chemistry	...	100	50	150
Organic chemistry	...	...	100	100
Quantitative analysis	...	...	50	50
Drug assaying	...	...	50	50
	250	250	250	750

BRANCH III—PHARMACY.

	1st year.	2nd year.	3rd year.	Total.
Pharmaceutical arithmetic	50	...	...	50
Pharmaceutical Latin	50	...	...	50
Theoretical and practical operative pharmacy	200	50	...	250
Manufacturing pharmacy	...	100	100	200
Dispensing pharmacy	...	100	100	200
Commercial pharmacy	...	50	75	125
Pharmaceutical jurisprudence	...	...	25	25
	300	300	300	900

(Signed) THEODORE J. BRADLEY, *Chairman.*

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council."—Part of Chapter VI, Article VI of the By-Laws.

Article IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meetings of the Local Branches should be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter.

BALTIMORE.

The March meeting of the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, which was held at the Hotel Emerson on March 24, 1925, was a very interesting one from three standpoints.

First, Dean Charles H. LaWall, of the Philadelphia College of Pharmacy and Science, was the guest of the Branch on this occasion.

Second, Mrs. Frank P. Walter, violinist, accompanied by Miss Broadbelt at the piano, rendered some very enjoyable selections.

Third, the attendance at this meeting was unusually large, and was an encouraging evidence of the increasing interest of the members and friends in the happenings of the Branch.

The illustrated lecture of Dr. LaWall—"The Romance of Chemistry"—was especially pleasing and instructive, and held the interest of every one present from the time he painted the word picture of the earliest history of chemistry as represented by the bearded monk attempting to prepare the "Elixir of Life" or the "Philosopher's Stone," on to the concluding lines portraying the possibilities in sight and in our vista as set out by Dante Gabriel Rosetti—

"And though thy soul sail leagues and leagues beyond—still, leagues beyond these leagues, there is more sea."

The April meeting of the Branch will be held at the Emerson Hotel on April 29, 1925. Dr. H. C. Fuller will be the speaker and will have as his subject—"Solvents Used in Pharmacy." Mrs. H. L. Meredith of Hagerstown, Md., will be the soloist of the evening. Mr. Frank J. Slama, Senior student at the School of Pharmacy, University of Maryland, will accompany Mrs. Meredith on the piano.

B. OLIVE COLE, *Secretary-Treasurer.*

DEBATE.

SCHOOL OF PHARMACY, MEDICAL COLLEGE OF VIRGINIA, AND SCHOOL OF PHARMACY, UNIVERSITY OF MARYLAND.

The members of the graduating class of the School of Pharmacy of the Medical College of Virginia, Richmond, attended the meeting of the American Chemical Society in Baltimore during the week of April 6th; they were the guests of Messrs. Sharp & Dohme, at a luncheon at the New Howard Hotel on April 8th, and were later shown through their laboratories. These students also held a debate with the members of the graduating class of the School of Pharmacy of the University of Maryland, on Wednesday evening, April 8th, 8 P.M. The subject was "Resolved that the Dispensing of Alcoholic Liquors Should be Continued by the Pharmacist." The speakers for the School of Pharmacy of the Medical College of Virginia were Messrs. Landon Timberlake and Nathan Sharove. The speakers for the School of Pharmacy of the University of Maryland were Messrs. Silvio Alessi, M. P. Ernst, and Samuel Raichlein. The visitors upheld the affirmative, and carried off the honors of the debate.

Prof. L. C. Bird, Secretary of the Students Organization, was the coach for the Richmond boys, and Prof. E. E. Ericson, Assistant Professor of English, was the coach for the Maryland boys.

The Judges were Messrs. John C. Muth, of Messrs. Muth Bros. & Co., Willis R. Jones of the law firm of Briscoe & Jones; Homer C. House, head of the Department of English of the University of Maryland.

Dr. Frederick E. Lee, dean of the College of Sciences of the University of Maryland, presided at the meeting, and Dean Wortley F. Rudd, of the School of Pharmacy of the Medical Col-

lege of Virginia, addressed the students during the intermission.

Music for the occasion was furnished by the Orchestra of the School of Pharmacy, University of Maryland, led by Wm. T. Schnabel. The debate itself was interesting and instructive, and also afforded the means of establishing a better understanding between the students of various schools of pharmacy and their friends.

B. OLIVE COLE, *Secretary of the Faculty, School of Pharmacy, University of Maryland.*

NEW YORK.

The April, 1925 meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was called to order in the lecture hall of the New York College of Pharmacy Building at 8:15 o'clock on Monday evening, April 13th, with President Hostmann in the chair. One hundred and eight members and friends were present.

The minutes of the preceding meeting were read and approved.

Treasurer Gerstner submitted his report which was ordered filed.

Education and Legislation: Chairman Lehman brought in a report of the proposed narcotic laws and prohibition laws and also stated that the law requiring three years college for pharmacists after 1928 had passed and that the medical practice had been vetoed.

Membership Committee: The following applications were received for membership in the Parent Organization: Prof. Marston T. Bogert, Columbia University, New York, N. Y.; Henry F. Tartaglia, 919 E. 5th St., Brooklyn, N. Y.

New Business: Secretary Schaefer announced that Dr. H. M. Whelpley had been declared the recipient of the 1925 Remington Honor Medal. It was moved, seconded and carried that a special meeting be held on the evening of May 25th for the purpose of presenting Dr. Whelpley with this medal.

Dr. Jacob Diner, the delegate to the New York Pharmaceutical Conference, brought in a report on the work being done by this organization.

Chairman Turner Currens of the Special Transportation Committee brought in a brief report outlining his plans as chairman of this committee to insure a large attendance at the Des Moines annual meeting of the Parent Organization.

Scientific Section: Dr. Diekman read a report consisting of abstracts of current articles and of the formulas and compositions of several new preparations.

Chairman Hostmann now introduced Professor Marston T. Bogert who addressed the meeting on the subject of "Science and Art in the Perfume Industry." The lecture was illustrated with many slides and specimens. At the conclusion of his talk Dr. Bogert answered various questions put to him.

A rising vote of thanks was then extended to the speaker after which the meeting was declared adjourned.

HUGO H. SCHAEFER, *Secretary.*

UNIVERSITY OF NORTH CAROLINA.

The twenty-third meeting of the University of North Carolina Branch of the A. PH. A. was held in Phillips Hall on Wednesday evening, April eighth.

Dr. G. A. Russell, physiologist for the Vick Chemical Co., of Greensboro, who is in charge of the experimental cultivation of *Mentha arvensis* in North Carolina, spoke on "Some Recent Investigations by the United States Department of Agriculture of the Cultivation of Drug Plants in the United States." Until recently Dr. Russell was connected with the Bureau of Plant Industry.

The lecture, which was highly interesting and equally instructive, was prefaced by a short account of the formation and function of the U. S. Department of Agriculture. The lecturer then spoke of the several investigations of the cultivation of drug plants which have developed into commercial crops in the United States.

The most significant and interesting part of Dr. Russell's address was an account of the work being done in encouraging the cultivation of *Mentha arvensis* in North Carolina. The experimental farms in cultivation show that the climatic and soil conditions of North Carolina are admirably suited for the commercial production of this plant. It would require about 6000 acres planted in mint to satisfy the minimum demand for the menthol consumption by North Carolina industries alone, and that farmers may reasonably expect a return of $100 per acre from this crop. In view of the fact that it is easily cultivated and harvested it should prove to be a very valuable addition to our farm products.

After the lecture the annual social evening of the Branch was held in the pharmaceutical

laboratories. A most delightful musical program was rendered by several students of the School of Pharmacy. Following this delicious refreshments were served.

In addition to Dr. Russell the Branch had as special guests Dr. E. V. Zoeller, President of the State Board of Pharmacy, and Mr. H. E. Whitmire, chemist for the Vick Chemical Co. The Branch wishes to take this means of thanking the Company for giving it the privilege of hearing Dr. Russell deliver the interesting and instructive address.

NORTHERN OHIO.

The regular meeting of the Northern Ohio Branch of the A. PH. A. was held at the School of Pharmacy, March 25th. The meeting was called to order by Willard M. Fox, President.

The speaker of the evening, Professor C. C. Arbuthnot, was introduced, his subject being "The Business Cycle."

Professor Arbuthnot speaks authoritatively on this subject and with clear-cut examples. He gave plausible explanation for the causes of business prosperity and business depression.

A few of the points are enumerated herewith:

Man has had ups and downs in one form or another from the earliest dawn of history—at present we refer to the rise and decline in business. In other words, the business cycle does not follow a straight line.

Two causes of prosperity: (1) Prosperity due to normal increased demands; and (2) Prosperity due to inflamed imagination—overdrawn notions.

The causes for prosperity can generally be traced to some new development, such as war, development of new resources of a country, or new business ventures. These, when carried to the extreme, find their end in depression, be that great or little.

A business boom in any line is likened to over-stimulation, with subsequent collapse in depression.

The determination of the length of time for the rise to the peak of prosperity and its subsequent decline was thought to be a factor not easily determined, if at all possible of determination.

The Federal Reserve Bank was credited with the stabilization of the Country's Banking System, making financial crises practically impossible. Possible relief for these fluctuations in business was offered by holding back public improvements, whether they be federal, state, municipal, or private, until such time as business has gone below the average, which means the balancing of expenditures by sensible application of preventive measures to excesses in either direction—this scheme to prevent the very high peak of prosperity and the very great depression in a business slump. The psychological effect was also taken into account in both rise and fall in business.

E. D. DAVY, *Secretary.*

PITTSBURGH.

The following is a brief résumé of the activities of the Pittsburgh Branch of the A. PH. A. since the last annual meeting of the parent organization.

Meeting of October 21, 1924, also the meeting of November 18, 1924—"The Practical Application of the Rarer Elements," by Dr. J. H. Wurdack.

Meeting of December 16, 1924—"The Pharmacology of Heart Stimulants," by Dr. E. C. Reif.

At this meeting nominations were made for officers to serve for the ensuing year.

Meeting January 16, 1925—"The Value of Botany to the Retail Pharmacist," by Prof. I. P. Griggs.

At this meeting the following officers were elected: *President*, F. J. Blumenschein; *Vice-President*, F. H. Woods; *Treasurer*, P. Henry Utech; *Secretary*, B. E. Pritchard; *Delegate to the House of Delegates*, Louis Emanuel.

Meeting February 17, 1925—"Some Reactions of the Oral Fluids," by Dr. A. F. Judd.

At this meeting announcement was made of the death of Secretary B. E. Pritchard and the following Resolution unanimously adopted.

> Deeply appreciative of the many services rendered this group by our late co-worker Benjamin E. Pritchard, we, the members of the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, desire formally to express our profound sorrow at his passing, and hope that his unceasing efforts for pharmacy will serve as a stimulus to those of us who are left to continue the work which he so ably advanced.

The death of Mr. Pritchard causing a vacancy in the office of Secretary, Louis Saalbach was elected to succeed him.

Meeting March 17, 1925—"The Pharmacist and his Microscope," by Prof. W. D. Wardlaw.

Meeting of April 21, 1925—Illustrated lecture on "A Drop of Water," by Dr. L. K. Darbaker.

LOUIS SAALBACH, *Secretary.*

PHILADELPHIA.

The April meeting of the Philadelphia Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on Tuesday evening, April 14th, at the P. A. R. D. Building. About twenty-five members and friends attended the monthly dinner at the Longacre Hotel, which preceded the meeting.

President Smith called the meeting to order at 8:30 o'clock and the Secretary read the minutes of the March meeting and reported two new associate members, Messrs. John J. Kelly and E. D. Michener, of Philadelphia. A report of the Auditing Committee stating that the Treasurer's books had been found correct also was read.

The following committees were appointed by the President:

Membership—Ivor Griffith, Chairman; E. J. Hughes, Leo G. Penn, George Miller.

Fraternal Relations—E. F. Cook, Chairman; Ambrose Hunsberger, F. E. Stewart.

Practical Pharmacy—B. C. Goodhart, Chairman; E. D. Michener, C. H. LaWall.

Professor Cook gave a report on the plans for the display at the A. M. A. Convention at Atlantic City in June. He announced that several papers would be presented, one by Dr. Robert A. Hatcher on "The New Pharmacopœia" and a joint paper on "New and Old U. S. P. Remedies" by Dr. H. C. Wood, Jr. and Ambrose Hunsberger.

The following were named as members of a Committee to prepare the display material. H. C. Wood, Jr., Ambrose Hunsberger, John K. Thum, Ivor Griffith and C. H. LaWall.

The Secretary reported that the joint letter of the P. A. R. D., the Philadelphia Drug Exchange and the Philadelphia Branch of the A. PH. A., regarding the Headquarters Campaign, would be mailed by the 15th of the month, in time to obtain results on the 17th, **All Pharmacy Day.**

Professor Gershenfeld presented the following written motion to be acted upon at the May meeting:

> "Moved that a committee of three, consisting of the *Vice-President*, the *Secretary*, and the *Retiring President*, be appointed whose duty it shall be to make all arrangements for all dinners and other social affairs of the Branch."

Professor Cook moved that the Branch extend an invitation to the A. PH. A. to hold its 1926 convention in Philadelphia. This was seconded and passed. The motion was to be sent to Chairman C. H. LaWall, of the *Contact Committee* of the A. PH. A.

Professor Louis Gershenfeld, one of the speakers of the evening, was then introduced. He gave the branch a most interesting discussion of household pests, a very timely topic for this season of the year. The subject was treated from several angles. First, it was shown that the initial step in the eradication of these pests lies in destroying their breeding places, such as stagnant water which serves for developing mosquitoes; dirt and moisture for fleas; food for roaches, etc.

Then the speaker divided his material into the following headings, discussing each case individually:

Baits. *Ants and Flies: Arsenic Compounds*—Sponge saturated with a mixture of 1 oz. sugar, 10 grains Sodium Arsenate and 3 oz. of water. Care to be taken to safeguard children.

Formaldehyde—1 ounce of Formaldehyde to 1 quart of milk or sweetened water.

Rats: Sodium Silicate—1 ounce to one quart of sweetened water.

Barium Carbonate—25 per cent in cereal or sweet cheese.

Plaster Paris in flour or cereal—for rats and roaches.

Phosphorous Compounds.

Traps. *Flies and Roaches*—Trap with following bait: fermented molasses; 1 ounce to 3 ounces of water.

Hot water to kill the trapped insects; this method destroying eggs and all.

Moths—Bags and cedar chests, treating material first by shaking and aerating.

Refrigeration plants for storage.

Strong heat.

Fumigation and Insecticides. *Formaldehyde*—A fumigant but not an insecticide.

Hydrocyanic acid—Very valuable but greater danger in its use unless handled by a skilled operator.

Sulphur dioxide—Very valuable in proper concentration—3 to $3^1/_2$ pounds to 1000 cu. ft. space and allowed to remain from 6 to 12 hours.

Contact Insecticides. *Kerosene, Gasoline, etc.*—Quite satisfactory.

Carbon Disulphide and Carbon Tetrachloride—Too costly for the amount required.

Sodium Fluoride—Most valuable of powder type; dilute with flour.

Naphthalene—Large amounts necessary for fleas and moths.

At the close of Professor Gershenfeld's talk, Charles E. Mullin presented a most interesting

story of the moth and its habits. Mr. Mullin spoke particularly of a new preparation which is being used successfully for moth-proofing materials. He showed many interesting plates and cabinets of materials, half of which had been subjected to the moth-proofing process and then subjected to moths. Mr. Lawsberg, a representative of the Interstate Chemical Company, of New York, was present and gave several interesting comments on the subject under consideration.

An open forum was held at the close of the program and a rising vote of thanks was given to the contributors to the program of the evening.

ADLEY B. NICHOLS, *Secretary.*

THE SALE OF BIOLOGICALS.

Biologicals are displacing some of the drugs, and to that extent the prescription department suffers unless these products are handled by pharmacists. Recently there has been large demand for smallpox vaccine; to what extent this was supplied by pharmacists we are not in position to say, but certainly only a part of that used. Knowledge of these biologicals is essential for satisfactory results and also proper storage of them. Chairman S. S. Dworkin of the Committee on Commercial Interests of New York State Pharmaceutical Association is endeavoring to arouse a greater interest in the sale of these products, for he contends, and rightly, that the opportunity to handle them will be accepted by others—because they will be employed by physicians. Some of the articles bearing on the subject from various standpoints may be found in the PROCEEDINGS A. PH. A., volume 50, p. 557; JOURNAL A. PH. A., July, 1912, September, 1914, March, 1915, August, 1916, October, 1917, December, 1924, pp. 1162–1164.

A questionnaire has been prepared and retail pharmacists are requested to send replies to Samuel S. Dworkin, Chairman N. A. R. D. Biologic Products Committee, 151 St. Ann's Ave., Bronx, N. Y. Other members are O. U. Sisson of Chicago and S. L. Hilton of Washington, D. C.

QUESTIONNAIRE.

1. Do you stock any biologic products?
2. Give the names and prevailing prices of the most often prescribed biologicals and serums, and, if possible, the names of their manufacturers.
3. Do physicians in your locality use biologic products in large or small quantities in their office practice?
4. Do your physicians purchase biologic products from retail pharmacists or from physicians' supply houses?
5. Give names and addresses, if possible, of any supply houses known to you.
6. Do you know of any established agency for distribution of biologicals and serums owned by a registered pharmacist?
7. Do you think physicians would buy more biologicals from pharmacists if the latter carried larger stocks, and could pharmacists be persuaded by a campaign of education to increase their facilities in this regard? Reply fully.
8. Do you favor establishing local distributing stations (in registered pharmacies) for supplying the section with biologic products?
9. Do you have any dispensing physicians in your vicinity?
10. Do you consider an elementary course of information as to the biologic therapy and related topics would be welcomed by pharmacists?
11. Do you dispense soda and ice cream?
12. Have you any refrigerators?
13. Are you a distributor of so-called free serums and biologicals, supplied by city or state health departments? If so, state on what conditions. Give a full list and name of the supplying institution.

The committee would appreciate your forwarding any news clippings published in medical, pharmaceutical and other publications on the subject of biologicals. This will tend to extend the scope of the committee's activities and its value to druggists.

RECENT SMALLPOX WARNINGS.

There has been a greater prevalence of smallpox in all sections of the country recently than for many years. It may be that the reason for this prevalence is that more or less indifference has developed relative to vaccination because there have been so few cases in recent years. Vaccination also may account for the prevalent milder form of smallpox; the number of cases, however, in the larger cities, has prompted the officials to issue warnings, and also to ask the coöperation of citizens for general vaccination, at least of those who have not been vaccinated for a period of five years.

EDITORIAL NOTES

Editor: E. G. EBERLE, Bourse Building, Philadelphia, Pa.

Members of the Council, A. PH. A.: JAMES H. BEAL, *Chairman;* S. L. HILTON, *Vice-Chairman;* ROBERT P. FISCHELIS, *Secretary;* CHARLES H. LAWALL, HENRY M. WHELPLEY, H. V. ARNY, A. G. DUMEZ, CHARLES E. CASPARI, W. L. SCOVILLE. *Ex-Officio:* CHARLES W. HOLTON, President; Vice-Presidents, PAUL S. PITTENGER and WILLIAM MANSFIELD; WILLIAM B. DAY, Secretary; E. F. KELLY, Treasurer; W. BRUCE PHILIP, Chairman of the House of Delegates. Editors of the JOURNAL and YEAR BOOK: E. G. EBERLE and A. G. DUMEZ. Committee on Publications: R. P. FISCHELIS, *Chairman;* H. V. ARNY, PAUL S. PITTENGER, E. F. KELLY, WM. B. DAY, A. G. DUMEZ, E. G. EBERLE.

Collaborators: The members of the Council; the Editor of the YEAR BOOK, A. G. DUMEZ; E. FULLERTON COOK, Chairman, U. S. P. Revision Committee; W. L. SCOVILLE, Chairman, N. F. Revision Committee; the Chairmen of the Sections, A. Ph. A.: PAUL S. PITTENGER, WILLIAM MANSFIELD, JOHN C. KRANTZ, JR., R. S. LEHMAN; W. BRUCE PHILIP, Chairman of the House of Delegates, A. Ph. A.; W. H. ZEIGLER, President A. C. P. F.; CHARLES B. JORDAN, Chairman Executive Committee, A. C. P. F.; H. LIONEL MEREDITH, President, N. A. B. P.; HENRY C. CHRISTENSEN, Secretary, N. A. B. P.

BULLETINS RELATING TO HEADQUARTERS.

Bulletins to be displayed in pharmacies are being issued—arranged and distributed through the AMERICAN PHARMACEUTICAL ASSOCIATION—C. W. Holton, President, Newark, N. J.; William B. Day, Secretary, Chicago, Ill.; E. L. Newcomb, Publicity Director, University of Minnesota, Minneapolis, Minn. The following bulletin relates to the library and reads:

GREAT LIBRARY FOR PHARMACY WILL SERVE PUBLIC.

EVERY SCHOOL CHILD AND EVERY LAYMAN TODAY KNOWS THE SIGNIFICANCE OF A DIET WITH THE PROPER AMOUNT OF VITAMINS.

The discovery of the rôle played in human metabolism by such complex substances as vitamins, thyroxin and insulin has taught much more to the pharmacist, the physician and other scientists than to the layman. An entirely new line of research for attack on the problems of health and disease has been indicated to those of these professions.

Pharmacists, wholesale, manufacturing, and retail, now know that practically all of our vegetable drugs must be restudied. Our old methods of testing have not been sufficient. Important vitamin-like substances in our remedial agents have undoubtedly escaped our attention. We must begin with the growing medicinal plant to develop and apply new biopharmaceutical methods of testing.

A few specific remedies and methods of treating certain diseased conditions have been discovered. Much more is yet to be done. The function of the pharmacist and of the field of pharmacy as a whole is to supply remedies prepared in the light of modern research and to carry on new research for their continual improvement.

The first task in the restudy of any drug is a careful review of its literature—library research. All pharmaceutical interests of the United States are now unanimously back of a movement being directed by the AMERICAN PHARMACEUTICAL ASSOCIATION to establish a great Headquarters Building. An extensive and complete pharmaceutical library will be a prominent feature of this institution. This library will be the fountain-head from which much research of far-reaching importance to the public will have its origin. It will be of splendid assistance to research workers in fields closely allied to pharmacy.

One million dollars is to be raised for this work, the benefits of which will accrue to the public as well as to pharmacy. $500,000 has already been subscribed. Indications are that the full amount will be obtained at an early date.

Another bulletin recently issued brings the museum and its value to the attention of the public in an interesting way:

THIS IS AN AGE OF VISUALIZATION.

PHARMACISTS TO ESTABLISH GREAT MUSEUM.

Air-castles precede realization. In literature, art and science, and now in business, everywhere, our objectives for the future are visualized and are being actually realized.

To properly visualize the future we must know the present; to know the present is to accurately see the past; to see the past is not always easy.

Since early times great museums have been maintained to help all to know the past. Many great museums representing different phases of human endeavor exist in this country. There are several splendid collections illustrating the progress of Pharmacy, but there is no National Pharmaceutical Museum.

The pharmacists of the United States are now united in an undertaking to establish a central Headquarters Building in which will be featured and developed a National Pharmaceutical Museum. Such a museum will benefit pharmacy. It will benefit the public. It will make more rapid the progress of pharmacy in the important professional service which it renders to the public.

LIBRARIES FOR REFERENCE AND RESEARCH.

In all cities there are libraries, but only in the larger cities, as a rule, is there a possibility of establishing libraries which serve a special purpose.

Among these, we have the Lloyd Library in Cincinnati, which is known the world over, not only to pharmacists but is consulted by scientists from all parts of the world.

The library of the Commercial Museum in Philadelphia has some unique features, and serves particularly the manufacturing interests of all industries. The classes of books which form its strong point are international official statistics, imports and exports, tariffs, and directories. It contains more than 400 foreign and domestic directories of city and trade alone. Another source of information available here is that relating to the agricultural and industrial possibilities of various countries.

The United States Army Medical Library contains more than 800,000 volumes, making it the largest medical library in the world. The library has an appeal to the literary as well as to the medical men.

The library of the AMERICAN PHARMACEUTICAL ASSOCIATION, in its headquarters, should be made available to research workers in pharmacy and of the pharmaceutical industries. Reference to the possibilities of a library are made in the articles by Professor Zada M. Cooper, that by Frederick B. Kilmer, and in other communications relating to the headquarters and printed in preceding issues of the JOURNAL.

BULLETINS OF THE DRUG TRADE BUREAU OF PUBLIC INFORMATION.

Director Robert P. Fischelis has issued Bulletins C-17 to 20 of the Drug Trade Bureau of Public Information.

Bulletin C-17 gave publicity to the All-Pharmacy Day on April 17.

Bulletin C-18 relates to the census of drug stores throughout the country, and the number of salesmen employed by wholesalers. Reference to this is made on page 365 of the April JOURNAL.

Bulletin C-19 announces the meeting of the American Pharmaceutical Manufacturers' Association and their "Declaration of Belief," which points out the obligations of every pharmaceutical manufacturer.

Bulletin C-20 discusses the large number of bills proposed in the various legislatures, and the enactment into laws of many of them.

PERSONAL AND NEWS ITEMS.

Sir William S. Glyn-Jones is conferring with druggists throughout Canada relative to drug trade conditions. On April 10 he addressed a meeting held under the auspices of the Province of Quebec Pharmaceutical Association at the Windsor Hotel, Montreal. He gave considerable attention to the evil of price cutting, and how it had been remedied in England by the adoption of some of the tactics of the trade unions.

Manufacturers and wholesalers who dealt in 4000 proprietary articles set the retail price. If the retailer cut the price of one of these articles further orders would not be filled. If a single article was sold at the cut rate, the entire lot was withheld. As a consequence of the adoption of these tactics through the operation of the Proprietary Articles Trade Association fair trading system, fair profits for retailer and wholesaler had been established. Sir William related his own experience stating that he was one of nine druggists compelled to cut prices by the action of one of their number until 60 per cent of the business earned a gross profit of only 7½ per cent. To make up for this low return they were compelled to resort to methods which were neither in the interests of the manufacturer nor of the general public. As a result of the work of the organization 80,000 stores are selling P. A. T. A. articles at protected prices. To bring this about the coöperation of the wholesale trade was essential. The success of the plan in Great Britain

was due to the coöperation of the three interested sections, the manufacturers, the wholesalers and the retailers. He urged Canadian druggists to adopt some system whereby uniformity in prices of proprietary articles would be established.

Ex-President L. E. Sayre, Dean of the School of Pharmacy of the University of Kansas, has been in poor health for several weeks. Reports indicate that he is improving, but very slowly.

W. F. Gidley, formerly professor at Purdue University School of Pharmacy, but now head of the Pharmacy Department at the University of Texas, has been named Chairman of the A. PH. A. Membership Committee of Texas. The Galveston school has fallen into line with other pharmaceutical institutions, and will inaugurate the three-year course in pharmacy beginning with the next school term.

Ex-President James H. Beal has been appointed delegate from the AMERICAN PHARMACEUTICAL ASSOCIATION to the state meetings in California, Oregon and Nebraska.

President Charles W. Holton will be one of the speakers and honored guests at the North Carolina Pharmaceutical Association and will be a delegate.

Secretary William B. Day will attend the meeting of the Wisconsin Pharmaceutical Association, as delegate of the A. PH. A.

Dean D. B. R. Johnson has accepted appointment as the A. PH. A. delegate to the Oklahoma Pharmaceutical Association meeting.

J. Leon Lascoff is chairman of the Retail Drug Division of the Home Service Appeal for the Salvation Army in Greater New York.

DEATH OF EX-PRESIDENT LEWIS C. HOPP.

Just before the completion of the May JOURNAL we are advised of the death of Ex-President Lewis C. Hopp, May 7th. The deceased had been in declining health following an attack of pneumonia several months ago. Mrs. Hopp died Nov. 2, 1922, soon after the A. PH. A. convention in Cleveland. Mr. Hopp was President of the AMERICAN PHARMACEUTICAL ASSOCIATION 1903–04. He was the first Secretary of the Ohio State Pharmaceutical Association, President of the Cleveland College of Pharmacy for many years, and an alumnus of the class of 1875 of the Philadelphia College of Pharmacy. He is survived by two daughters.

A sketch of Ex-President Hopp will appear in the June number of the JOURNAL.

Ex-Treasurer H. M. Whelpley, the Remington Honor Medalist for 1925, on March 14 addressed Signal Hill Chapter, St. Louis, of the Daughters of the American Revolution, on "Archaeology."

O. L. Biebinger, general manager of the Mallinckrodt Chemical Works for many years, was elected President of that corporation at the last annual meeting.

A. C. Schulte, President of the Missouri Pharmaceutical Association, recently assisted in the organization of the Hannibal Retail Druggists' Association. The Mark Twain Hotel has been selected as the headquarters for the coming state meeting.

Edward Plaut has established a research foundation in memory of his father, to be known as the Plaut Research Laboratory. The work to be undertaken will be a continuation of a series of researches which have been carried on in the Research Laboratory of Lehn & Fink, Inc., for a number of years; the results of these researches will be published from time to time.

Dean Albert Schneider, of the School of Pharmacy of the North Pacific College of Oregon, will again deliver a course of lectures on "Methods of Crime Investigation," in the summer sessions of the University of California, Berkeley, Cal. He will also give a laboratory course in "Police Microanalysis" to a select group from the Department of Police of Berkeley.

President E. G. Raeuber, of Wisconsin Pharmaceutical Association, recently was host to his parents, Mr. and Mrs. Edward A. Raeuber, at their 60th wedding anniversary.

Secretary Charles H. Waterbury, of the National Wholesale Druggists' Association, on March 28th addressed the meeting of the National Fire Waste Council in Washington, D. C. He described the methods employed by wholesale druggists in reducing fire losses by preventive methods.

Francis E. Holliday, general representative of the National Wholesale Druggists' Association, who with Mrs. Holliday was on a Mediterranean trip, has returned and is again at his desk.

Charles Ehlers, member of the AMERICAN PHARMACEUTICAL ASSOCIATION, and active in organization work, has been named a member of the Ohio Board of Pharmacy.

Henry J. Schmidt, of Elizabeth, N. J., has recently disposed of his drug business, and will retire from active work. He has been steadily engaged in pharmacy since 1865. He gradu-

ated from the Philadelphia College of Pharmacy in 1873, and became a member of the A. PH. A. in 1904. A testimonial dinner was given to him by the Elizabeth Pharmaceutical Association, and he has been elected an honorary life member of the organization.

Caldwell Sweet opened the drug store at present location in Bangor, Me., fifty years ago; in 1881 he became a member of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Addison Dimmitt, of Louisville, Ky., and Robert S. Lehman, of New York, grace the "Pharmaceutical Personalities" columns of the *Druggists Circular* for April; both of them are members of the A. PH. A.

The "Publicity Helper," supplement to the *Northwestern Druggist,* besides articles on State and National Association work, has full page reprints of the bulletins issued by the Northwestern Pharmaceutical Bureau and those in the interest of the A. PH. A. Headquarters. The illustrations are good and instructive; they serve a most useful purpose and will attract the attention of the public wherever displayed.

The Paine Drug Company, of Rochester, N. Y., has published an illustrated booklet depicting the pioneer days of Rochester, in commemoration of the centenary of this establishment. The etchings are of the beginnings in Rochester, even of the time when the thriving city of to-day was a "Dismal Swamp;" some of the early proprietors of the establishment are sketched.

The April number of the *Virginia Pharmacist* is largely devoted to the annual report of the Board of Pharmacy of Virginia. The Registered Pharmacists' Association of Virginia is interesting the pupils of Virginia grammar grade and high schools in an essay contest on "Why is Your Pharmacist More Than a Merchant?" The prizes aggregate $250.

The Druggists Circular for April contains a contribution by the Chairman of the Trade Committee of Kings County (N. Y.) Pharmaceutical Society, Charles E. Heimerzheim, on U. S. P. and N. F. Propaganda. One or the other suggestion made therein can be followed in other sections. Blotters, on which three official formulas are printed, are distributed at intervals to physicians, and members are advised, so the preparations may be dispensed without delay.

The *Southern Pharmaceutical Journal* is now located in the new Santa Fe Building, Dallas; this structure has received considerable attention by architects and the press. It is made up of one 20-story and four 10-story buildings, including 31½ acres of floor space.

The April *Bulletin of Pharmacy* discusses several publicity campaigns carried on by associations and individuals. More and more pharmacists are realizing on systematically conducted advertising programs.

OBITUARY.

THOMAS WAKEFIELD.

Thomas Wakefield, member of the AMERICAN PHARMACEUTICAL ASSOCIATION and well known druggist of Oak Park (Chicago), died April 15, aged sixty years.

Mr. Wakefield was a member of the Executive Board of the Chicago Retail Druggists' Association and while attending the monthly meeting became seriously ill; he was taken to a hospital, where it was found that he had a hemorrhage of the brain.

Funeral services were held in Oak Park and the body was taken to Kilbourn, Wis., for burial. The services in Oak Park were attended by many pharmacists of the city and the various drug organizations were represented.

Mr. Wakefield was a pharmacist of the old school and stood very high in the esteem of his community. He attended the Chicago College of Pharmacy in 1888 and 1889 and had been engaged in the drug business almost ever since, at Harlem Ave. and Madison Street in Oak Park.

Suitable resolutions were drafted by a special meeting of the C. R. D. A. and the Chicago Drug Club in which organizations he had been especially active. Mr. Wakefield was a well-known figure at the annual conventions of the N. A. R. D. and the Illinois Pharmaceutical Association, which he attended regularly.

G. ARTHUR KIEDAISCH.

G. Arthur Kiedaisch of the class of 1900, University of Illinois College of Pharmacy, passed away on February 3, 1925 following a stroke of paralysis. Mr. Kiedaisch was an unusually successful business man and had risen to the position of President and Manager of Wilkinson & Company Wholesale Druggists of Keokuk, Iowa.

During the hour of his funeral all of the business houses on both sides of the street in the block in which this company is located suspended business as a mark of their respect to Mr. Kiedaisch.

He was born June 27, 1877, the son of John F. and Mary M. Kiedaisch, and received his earlier education in Keokuk schools. He entered the employ of Wilkinson & Company in 1900 and became President and manager in 1911. Mr. Kiedaisch was Secretary of Keokuk College of Pharmacy and professor of pharmacy from 1904–1910, when the school was absorbed by Drake University. The deceased became a member of the A. PH. A. in 1904.

DR. JOHN NEWELL HURTY.

Dr. John N. Hurty, founder of the School of Pharmacy, Purdue University, and for two years its dean, life member of the AMERICAN PHARMACEUTICAL ASSOCIATION, and a pioneer in the modern health and sanitation movement in America, died at Indianapolis, Ind., on March 27, following a brief illness of influenza. He was 73 years of age and was born at Lebanon, Ohio. It has been said that Dr. Hurty was one of the three or four best known men in Indiana in the last thirty years. While he was identified with pharmacy for many years, he became deeply interested in sanitary matters and was nationally known as a health expert. He was Secretary to the Indiana Board of Health for twenty-six years, retiring in 1922. For many years he was professor of hygiene and sanitary science in the Indiana University Medical School, and was also a member of the faculty of the Indiana Dental College. Besides the AMERICAN PHARMACEUTICAL ASSOCIATION, he was a member of the American Medical Association, the American Association for the Advancement of Science, and the American Public Health Association, having served as President of the last-named organization. He was also a member of both the Indiana and Indianapolis medical societies.

The last paper contributed by Dr. Hurty to the Association was that at the Indianapolis meeting in 1917, and printed in the JOURNAL A. PH. A., volume VIII, p. 625, entitled "Drug Store Recollections." Reference was made to an address by him in the January Journal, 1925, p. 64. He joined the Association in 1882.

PROF. JULIUS MORGENROTH.

The death of Prof. Julius Morgenroth at the age of 53 years is announced. The deceased was one of the most distinguished pupils of Ehrlich, with whom he later published his now classical six papers on "Homolysins." Later on he conducted the bacteriological department of the Berlin Pathological Institute, but since 1918 he was at the head of the Chemotherapeutic Division of the Robert Koch Institute. Prof. Morgenroth was a pioneer in various bacteriological investigations, and it was he who introduced the intramuscular injection of serum as affording a more prompt absorption of antibodies. He also studied the action of toxins and antitoxins, but his most important work was in immunity and the chemotherapy of bacterial infections, his extensive researches leading to the discovery of the highly bactericidal power of various cupreine derivatives, particularly ethylhydrocupreine (Numoquin), which is now quite widely used in the treatment of pneumonia because of its specifically destructive action on the pneumococcus. His untimely death constitutes a severe loss to medical science generally and to chemotherapy in particular.

JARVIS A. WOOD.

Jarvis A. Wood, nationally and internationally known in the advertising and publishing business, died of pneumonia April 10. at his home in Wayne, Pa., following an illness of five days, aged 71 years. He was senior partner of N. W. Ayer & Son.

SOCIETIES AND COLLEGES.

THE COLLECTIVE WAY.

Dean Frederick J. Wulling says that "practically all other professions have realized more than pharmacy has, heretofore, the need and advantage of a sufficiently high degree of average intelligence and education to merit and receive public recognition of professional standing. The latest profession realizing this need is dentistry, and as a result the academic and technical standards of dentistry have advanced above those of pharmacy."

Continuing, he asks—"On what basis are professional standards fixed and justified? In my judgment, primarily upon the degree of responsibility involved in the service rendered. Is dentistry a more responsible profession than pharmacy? I do not admit that it is, and yet the highest dental standards of

to-day are certainly justified. Upon the basis of responsibility involved in the practice of pharmacy, the profession would certainly be justified in placing its educational and practical standards on a par with or above those of dentistry. Why has not pharmacy done this? Clearly because, as a group, pharmacists are too modest, too unassertive, and because as a whole they lack in the perception, discernment and understanding of their privilege and advantage."

He continues by saying—"Those pharmacists who have the understanding and ideals are in the minority. The majority are either indifferent or antagonistic, mostly indifferent, toward merited recognition or necessary advancement because they are not far-sighted enough. The minority has repeatedly tried to fix better standards, and although it has succeeded in developing progress, it has fallen short in its endeavor toward better and higher and more consistent ideals and attainments.

"The most fundamental reason for this failure, to my mind, has been the absence heretofore of a form of organization or machinery to unite all pharmaceutical interests and activities in all those points in which the interest is common. I do not mean a merging or consolidation, but rather an affiliation or federation. Many things pharmaceutical must be done collectively, coöperatively, associatively. The one great agency and facility for this needed collective work has been lacking, but fortunately is now in sight. I refer to the Pharmaceutical Headquarters Building, which will soon be a reality, and which is a matter of great rejoicing for all related in any way to pharmacy.

"Many have not yet contributed to this most worthy and necessary undertaking. There never has been before the American pharmacists a better and more substantial investment and opportunity to advance their standing and prestige, and also their profits. The intelligence, far-sightedness and even hard-headed business acumen of all pharmacists is now being put to test. I am persuaded the test will be fully met."

STATE ASSOCIATION MEETINGS.

Louisiana Association will meet on May 19 at New Orleans.

Sheffield is host for Alabama Association June 9, and Massachusetts will hold its annual meeting at Swampscott during the same week; also, Washington State, at Big Four Inn.

Colorado, Illinois, Mississippi, Missouri, New York and Pennsylvania will open sessions on June 16; Manitou, Decatur, Biloxi, Mark Twain's town, Niagara Falls and Washington respectively, are the convention points; Kentucky meets during the same week at West Baden, Ind.

Vermont opens the week of June 22 at Lake Morey; next day Maryland begins its sessions during the same week at Buena Vista, Pa.; at the same time West Virginia convenes at Deer Park, Md., and New Jersey celebrates at Spring Lake. Connecticut has selected June 25 and 26, at the Griswold, New London, for its meeting.

Ex-President James H. Beal will address the convention at Del Monte, California, May 25, and Nebraska, on June 19, at North Platte. President Holton will speak at North Carolina meeting, to be held at Blowing Rock June 23. Wisconsin meets on the same days at Green Lake, and Secretary William B. Day will be the A. PH. A. delegate. Virginia has designated the same days for the annual convention at Staunton; R. G. Pankow of Chicago will speak on a business subject, and E. G. Eberle will bring into his address the mission of pharmacy and the headquarters for American pharmacy.

Oregon Pharmaceutical Association has changed the date of its meeting to July 7; however, a special meeting will be held at Portland on June 16, under the auspices of Oregon State and Portland associations, at which Dr. James H. Beal will be one of the speakers.

KANSAS PHARMACEUTICAL ASSOCIATION.

The forty-sixth annual convention of Kansas Pharmaceutical Association at Wichita was a success in every way, from business and scientific sessions to drug show and entertainments. Publicity Director E. L. Newcomb was one of the speakers and brought not only messages of better service and greater service, but of progress in the Headquarters' campaign.

Miss Vada Watson, Kansas Wheat Girl, was guest of the Association, and she was accompanied by President and Mrs Campbell of Sterling College. Miss Watson gained her title by representing Kansas and presenting President Coolidge with a sack of Kansas cereal, to emphasize that Kansas grows the best wheat.

Carl Weeks was present and brought a message of cheer. H. S. Caldwell, President of

Oklahoma City Association, and member of Oklahoma House of Representatives, who made a strong fight for the Oklahoma pharmacy ownership bill, made an address. Though defeated in this measure, he was successful in defeating undesirable legislation. Oklahoma now has four druggists in the State Legislature.

GOLDEN JUBILEE MEETING OF GEORGIA PHARMACEUTICAL ASSOCIATION.

The 50th anniversary meeting of Georgia Pharmaceutical Association will be held at Tybee Island on June 15 and 16. Georgia Pharmaceutical Association was organized in Macon in 1875. The President of the Association elected at that time was Dr. John W. Clark and the Secretary, Dr. Fred King. The President at the present time is Jasper L. Brooks, and the Secretary, T. A. Cheatham.

TEXAS PHARMACEUTICAL ASSOCIATION.

Texas Pharmaceutical Association will meet in Fort Worth June 9 to 11, and promises to be largely attended. There is considerable interest in the Drug Show, and there will be a meeting of the Texas Qualifying Druggists' League. This organization is conducting a campaign of advertising to place the pharmacist in the proper light before the public and at the same time inform the people why the druggist is more than a merchant, and why articles properly belonging to the drug store should be purchased of the druggist. The advertising campaign thus far has been very satisfactory, and at the meeting in Forth Worth there will be a discussion of plans for the future. Carl Weeks will be one of the speakers of the convention.

AMERICAN DRUG MANUFACTURERS' ASSOCIATION.

The 14th annual convention of the American Drug Manufacturers' Association was held at Hotel Biltmore, New York, April 20 to 23.

The following officers were elected: President, S. R. Light, Kalamazoo, Mich.; Vice-Presidents, Oscar W. Smith, Detroit; Chas. G. Merrell, Cincinnati; Ralph R. Patch, Boston; Treasurer, Franklin Black, New York. Members of the Executive Committee: J. Fred Windolph, Norwich, N. Y.; S. B. Penick, New York; John F. Anderson, New York; Secretary, Carson P. Frailey, Washington, D. C.

President A. S. Burdick's address covered the activities of the Association. He spoke on the splendid work of the Contact Committee under the chairmanship of Dr. J. P. Snyder, and expressed appreciation of the coöperation of Government officials. He stated that good progress had been made by the Committee on Cost Accounting, headed by Mr. Noyes. President Burdick gave considerable attention to the subject of Education. He said that doctors are beginning to realize the importance of educating the layman regarding legitimate medicine. In Illinois, he said, the State Medical Society is raising a fund with which to carry on an actual campaign in the newspapers, and he felt certain that this would be productive of good results, not only to the profession, but to the layman and to the manufacturer as well. He remarked that new remedies were taking the place of older ones. This did not imply, he said, that the older remedies would simply be discarded but that they must pass through the crucible of research along the lines of investigation that are applied to the newer remedies. National and State legislation was discussed at length.

Dr. A. R. L. Dohme made the report for the pharmaceutical section and presided over its sessions.

The report of the committee on catalog simplification was made by Chairman Eli Lilly.

The biological section was presided over by Chairman E. M. Houghton.

Chairman J. P. Snyder presided over the meetings of the Scientific Section; these sessions were of great interest and importance.

In an address on "Scientific Therapy and Pharmaceutic Research," Dr. Morris Fishbein, editor of the *Journal of the American Medical Association*, laid before the meeting his views on the position of the drug manufacturer in modern medical progress. Tracing medicine through its "romantic" days and the latest era of "therapeutic nihilism," the speaker said that present-day therapy holds fast, on one hand, to such of its earlier armamentarium as has been proved meritorious by scientific pharmacology, and attacks disease, on the other, by producing the death of specific pathogenic organisms, by activating the tissues to resistance, and by supplying functional deficiencies.

Dr. Fishbein did not subscribe to the belief that incorruptible scientists do not exist outside of the walls of universities. He spoke in high appreciation of the work of the commercial chemist and pharmaceutical investigator.

These workers and the houses for which they function stand behind the physician in his fight against disease. With the growth of closer collaboration between these and the intermediate group of pharmacological, therapeutical, bacteriological, and medical scientists and commentarians, he believed, there was coming full warrant for implicit trust in the claims of manufacturers and greater assurance that success would more often attend the physician in his efforts to overcome diseases heretofore, by the majority, considered incurable.

The convention closed with a banquet. Dr. Alfred Burdick presided as toastmaster and two of the speakers were Senator J. L. Lenroot of Wisconsin and Dr. Ralph E. Heilman of Northwestern University.

OFFICERS OF AMERICAN MANUFACTURERS OF TOILET ARTICLES.

The 31st annual meeting of the American Manufacturers of Toilet Articles was held in New York, at Hotel Biltmore, April 21 to 23.

The following officers were elected: President, Northam Warren, New York. Vice-Presidents, C. M. Baker, New York, and J. A. Handy, Buffalo. Secretary-Treasurer, H. Henry Bertram, New York. New members of the Executive Board: J. W. Jones, Chicago; Gilbert Colgate, New York; F. C. Adams, Cincinnati; W. L. Schultz, Hoboken, N. J.; F. N. Langlois, Boston; Carl Weeks, Des Moines, Iowa.

ST. LOUIS COLLEGE ALUMNI WILL CELEBRATE 50TH ANNIVERSARY.

The alumni of 1875, of St. Louis College of Pharmacy, will celebrate its golden anniversary and with them the alumni of other years will fraternize and dine. A committee on organization met April 14, with the following present: Messrs. Tritschler, Baepler, Gietner, Renner, Griesedieck, Pfeiffer, Hoffman, Thaler, Overmann, Aufderheide, Noll, Klosterman, Prof. Francis Hemm and W. H. Lamont.

FORTIETH ANNIVERSARY CELEBRATION AT THE UNIVERSITY OF WISCONSIN.

Dr. Edward Kremers, in writing of the fortieth anniversary of the completion of its course by the first pharmacy class that entered the University, stated that the festivities originated in a University event, but the convocation was an event of students and alumni and of the State. The honorary degree of Master of Pharmacy was conferred on one of the University's first graduates in this course—Henry G. Ruenzel. The director in presenting the honored alumnus to President E. A. Birge said that "he has continued to take a scientific interest in pharmacy in spite of the commercial movement that has swept the country.

"Individually, and as Chairman of the Research Committee of the State Pharmaceutical Association, he has set an example to his colleagues. For almost twenty-five years he has faithfully served his profession and the State as a member of the Board of Pharmacy. As such he has endeavored to raise the status of his calling and thus to make the pharmacist a better servant of the public."

Otto J. S. Boberg received the same honor and in introducing him Dr. Kremers said "Mr. Boberg had completed his pharmaceutical studies at the University of Copenhagen before coming to the United States forty years ago and ever since has been identified with pharmacy in Wisconsin. No sooner had he joined the State Pharmaceutical Association, when it was recognized by his colleagues that the Association had acquired in him an unusual member. His numerous papers clearly revealed his scientific bent of mind and his desire to serve the public through the application of his science. As member of the Board of Pharmacy for more than twenty years, he has given his best services to his calling and to the State."

The oil painting of Dr. Frederick B. Power, first director of the Pharmacy course, was taken from the walls of the University Hall, mounted on an easel and surrounded by plants. President E. A. Birge presided at the exercises and was assisted by Professors S. H. Goodnight and Director Edward Kremers. The speaker of the occasion was Dean William B. Day of the School of Pharmacy, University of Illinois, on the subject—"The Trend in American Pharmacy during the Past Forty Years."

After the convocation, the audience adjourned to the Museum of the State Historical Society, where Custodian C. E. Brown had arranged a collection of mementos illustrating life at the University between 1883 and 1885 next to the Historical Drug Store. It proved to be a pleasant gathering and the old "Troches" of 1885 opened up to the page of the Pharmaceutical Society, as well as photographs of members of the class and other items of historical and personal interest, afforded an abundance of opportunity for conversation.

A banquet closed the celebration, during which the honored guests made brief addresses, and also others, and letters from Professor F. B. Power, G. V. Kradwell and others were read. Dr. Kremers closed his letter by saying—"We rose from the festive board before any one had an opportunity to feel tired or bored, with the unanimous opinion that April 17th, All Pharmacy Day, had been a great day in the history of Wisconsin pharmacy."

THE PHARMACIST AND THE LAW.

HOW PRICES OF PROPRIETARY ARTICLES ARE MAINTAINED IN ENGLAND.

Sir William S. Glyn-Jones is at present in Canada; at this writing, he hopes to visit in the United States before returning to England. He is Secretary of the Proprietary Articles Trade Association and is entitled to a large part of the credit for making price maintenance effective in England. An address by him on price maintenance before the Music Trades Association was published in a recent issue of the *Montreal Pharmaceutical Journal*, and parts of the address are reprinted. In his introductory remarks Sir William said he had been invited as representative of a "well-organized trade" to impart the secret of the success of the drug trade in organization efforts to maintain prices. "Really there are no secrets to disclose," he said. "No body of traders need to organize in secret. Guilds, trade unions, protection organizations of manufacturers and traders come in for criticism which should be directed not to sectional organization but to the abuses of it."

"The more esprit de corps, the greater the coöperation; the better the organization existing in any branch of trade, the better will the interests of the public be served by that trade. Admittedly, self-interest and self-protection form the primary motive behind these organizations, but in the end it will be found that they succeed only so far as they add to the efficiency of the combined services rendered by their members to the community as a whole. The interests of those engaged in the music trade are not in conflict with those of the music purchasing public. Allegations to the contrary are due to superficial thinking, as is the opinion that what the public needs is absolutely unrestricted competition. The trader who poses as the heaven-sent friend of the public, to save them from the greedy profit grasping of his competitors, is generally a humbug as well as a traitor to his calling. Unrestricted competition leads to deception, crooked dealing, catch-penny methods, here and there a sprat thrown to catch a mackerel. It involves shopping in an atmosphere of suspicion; mutual distrust between manufacturer, wholesaler, retailer and the public, and results in inefficient and uneconomical service.

PUBLIC INTEREST COMES FIRST.

"At first sight, to prevent unrestricted competition is against the public interest. Experience, I maintain, proves the contrary. The real customers of the manufacturer are the public, the consumers; and the retail and wholesale buyers are merely the conduit pipes through which the goods pass from maker to consumer."

The relations of those mentioned were discussed—Sir William said that "in a conflict of interests, between the shop-keeper and the public, the manufacturer must always be on the side of the public.

"An examination of what happens under a system of unrestricted competition explains what, at first blush, may not be apparent. A manufacturer makes a proprietary article and creates a public demand for it. He wants to sell it, and the public wants to buy it. He and they need a distributing machine—as efficient and as cheap a one as possible. Unless there are exceptional circumstances, the manufacturer cannot deal directly with the public, and he needs an intermediary. The consumer wants to purchase with as litttle trouble and delay as possible; he likes to get the article at the nearest shop, if, indeed, he does not expect it brought to his doorstep. The shopkeeping community provides the most convenient and economic method of distribution. They at one and the same time render service to the manufacturer and to the purchasing public. Their profits are their wages. The public do not expect service for nothing, and will not get it. In the absence of a fixed selling price, experience shows that prices of proprietary articles will reach so low a level as to leave no profit at all. Then the trouble begins, both for the manufacturer and the consumer. Instead of taking his fixed and fair wage openly, the cutter of prices takes it by stealth, sometimes, if not dishonestly, at any rate by questionable methods."

SWINGS AND ROUNDABOUTS.

"The shopkeeper lives by the profit he makes out of his customers. If at one time you, despite the efforts of the salesman to dissuade you from purchasing the branded article he was offering to sell so cheaply, succeed in buying it, you may think you are a good buyer; but the cutter will recompense himself by the extra profit he must make somewhere or other, and your turn will come when purchasing from him or some other cutter an article of the value of which you are not so good a judge. What he loses on the swings he will make up on the roundabouts, and sooner or later, probably without knowing it, you will be patronizing the roundabouts."

The organization of the P. A. T. A. was then outlined and the speaker closed the address by presenting the

ETHICS OF PRICE MAINTENANCE.

"As bearing upon the question whether price maintenance is ethically justified, the report of a committee appointed by the government under the Profiteering Act—to report on the extent to which the principle of fixing a minimum retail price by manufacturers or associations prevails; what are its results; and whether the system is, in the interests of the public, desirable—is important.

"The committee came to the conclusion that it is clear that a manufacturer of a proprietary article, in fixing a margin of profit to the retailer, must determine a rate which (1) will afford the retailer a sufficient inducement to stock and push the sale of his product on a sound basis of trading; and (2) will not be so high as to deter the public from purchasing, or to induce them to look for a substitute which will equally serve the purpose at a lower price. They were satisfied that these considerations will effectively check any tendency to profiteering on the part of retailers in the case of such proprietary goods. Again, it was represented to them that where a trader has purchased from a manufacturer certain articles at a price agreed between them, it is an interference with the liberty of the trader to lay down any fixed price at which he is compelled to resell, and that, on broad general grounds, a trader, having purchased such goods, should have unrestricted liberties to dispose of them as he deems best in his own interest. They could not, on a close consideration of the subject, concur in this view; moreover, they believed it to be in the general interest that a fair living should be provided for the large and valuable class of the community who may be described as *shopkeepers*, who, if unrestricted competition is allowed to run unchecked, may gradually and piecemeal come to be devoured by their more powerful competitors, who, by dealing in a large range of goods, are able successively to swallow those who rely for their living upon a single range of articles. The witnesses who gave evidence before the committee were unanimous on this point, that provided the original price charged by the producer to the particular purchaser to whom he sells is fair and reasonable, the further steps in the transaction as between wholesalers, retailers and the consumer may be fixed and controlled to the advantage rather than to the detriment of the latter."

RÉSUMÉ OF KANSAS LEGISLATION.

The Kansas Legislature has adjourned and the *Sunflower Druggists' Bulletin* says that "taken as a whole it was a mighty good legislature and its dealings with the druggists were especially commendatory. From the very beginning the members in considerable numbers showed a very friendly attitude towards the druggists and upon inquiry we found that in every instance this friendly feeling had been precipitated by the home druggist of these members, who had talked to the member before he left home and had requested him to give respectful hearing to all matters affecting pharmacy. We found that a great part of our work had already been done by the druggists at home. This work, supplemented by the conscientious work of the Hon. C. M. McCaughan, the druggist member of Butler County, Hon. George W. Stansfield of Shawnee County, Senator Morton, both a doctor and drug store owner of Clay Center, and Senator Arbuthnot, a former druggist, but now a banker, of Ottawa County, made it possible to secure for the druggists of Kansas favorable consideration on all pending measures. As a result, House Bill 27, the Drugless Drug Store bill, passed both the House and the Senate without any fight whatever, and the bill has been signed by Gov. Paulen and when printed in the Statute Books will be effective."

"The druggists, while not responsible for its introduction, will be undoubtedly benefited by the passage of House Bill 182, introduced by the State Board of Agriculture. This bill makes it illegal for manufacturers of non-admitted livestock foods and remedies to

JUN 1 0 1925

sell them by agents in the State and will thus put the business in the hands of legitimate dealers to whom the business properly belongs."

BOOK NOTICES AND REVIEWS.

The Century Co., 353 Fourth Ave., N. Y. C., submitted the two following books for review.

Lead the Precious Metal. By Orlando C. Harn. With many Illustrations. Octavo 323 pp. Cloth $3.

Lead is as old as the hills or older and is almost as old in its use by man. Do you know that the metal lead is used in plumbing and building construction, in printers metal and other alloys, in ammunition, as bullets and shot, in storage batteries and electrolysis, in pipe organs and player pianos and in many other industries? Do you know that compounds of lead are an essential ingredient in such daily articles as paint, glass, pottery, rubber and a host of other products? Last, but not least, do you know that lead and its compounds play a very important rôle in pharmacy, medicine and chemistry?

The book before us presents these facts and many more in a popular style. It is a book written in agreeable language and is the most comprehensive popular compendium of facts on lead published up to date!

Outwitting Our Nerves. A Primer of Psychotherapy. By Josephine S. Jackson, M.D., and Helen M. Salisbury. Duodecimo 403 pp. Cloth $2.50.

In this "Primer of Psychotherapy" the authors present the simple and comprehensive discoveries and principles of Sigmund Freund, providing enough of biological and psychological background to make them intelligible and enough application and illustration to make them useful to the general practitioner and the average layman. In place of vain platitudes about worry and will power one is shown the real reasons for worry and the blues. There are chapters on The Subconscious Mind, The Real Trouble, Body and Mind, That Tired Feeling, The Bugaboo of Constipation, A Woman's Ills, Insomnia, etc.

It is the most cheerful, the most easily read and the most helpful healthbook published in years. Pharmacists should become acquainted with it! OTTO RAUBENHEIMER, PH.M.

PUBLICATIONS RECEIVED.

Reports from the Department of Medicinal and Perfume Yielding Plants of France. A Report of the Congress on the Cultivation of Medicinal Plants, held May 30 to June 7, 1924, being a report by Secretary G. Blaque, chiefly notes on the medicinal plants of Southern France. Report on the Medicinal Plants of the region of Reims, by M. Bertin; on the Culture of Perfume Plants of the South of France, by M. R. Cerighelli; a report on the Medicinal Plants of Northern Africa; also color plates of a number of plants, among them the following—the common centaury, the ash, wood mallow, German chamomile, alder buckthorn, arnica and the walnut.

The Magic, Psychic, Ancient Egyptian, Greek, and Roman Medical Collections of the Division of Medicine in the United States National Museum. By Charles Whitebread, assistant curator, Division of Medicine, United States National Museum. 8 vo., 44 pages, Washington, Government Printing Office.

This is a reprint of the article by Charles Whitebread from the proceedings of the United States National Museum. It is interesting because it describes many of the various drugs used from earliest times in the treatment of disease, exhibits of which are shown in the Museum under the following classification: Magic medicine; exorcism; invocation; incantation; amulets and charms; talismans; fetishes; transference of disease; signatures; the evil eye; sympathetical cures; psychic medicine; music; metallotherapy; laying on of hands; royal touch; hypnotism; pharmacological medicine; Egyptian medicine; Greek and Roman medicine.

In this booklet is shown the history of medicinal exhibits of the East Gallery; also, exhibits of the various periods referred to above; photographic copies of old prescriptions from the papyrus Ebers. There is much in the book that is interesting for the pharmacist, because it outlines all departments of medicine and its association with pharmacy. It attracts our attention at this time because of the establishment of the American Pharmacy Headquarters, in which matter of this kind, particularly as it relates to pharmacy, will be exhibited.

An Essay on the Investigation of Rhubarb, particularly in reference to its constituents, submitted by Hans Goldlin von Tiefenau for the Doctor's degree at the University of Basel.